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Research Article

Picking pearls from the Silk Road: Insights into the spider (Arachnida, Araneae) diversity in Georgia from the Caucasus Barcode of Life (CaBOL) project. Part III

Armen Seropian[1], Natalia Bulbulashvili[2], Hans-Joachim Krammer[3], Jana Thormann[3], Nils Hein[3], Elisabeth Karalashvili[1], Nino Kachlishvili[1], Anastasia Datunashvili[1]

1 *Institute of Ecology, Ilia State University, Cholokashvili av. 3/5 Tbilisi, 0162, Georgia*

2 *Rustaveli st. 9, 1400, Gori, Georgia*

3 *LIB: Leibniz Institute for the Analysis of Biodiversity Change, Bonn, Germany*

Corresponding author: CorespAuthorName (armen.seropiani@iliauni.edu.ge)

Abstract

The present study contains information about a small number of spiders collected between 2018 and 2023. The spiders were determined to species level and partially assisted by genetic barcoding of the COI gene. Among the resulting 33 species, 23 species and three genera, are recorded from Georgia for the first time, of which 11 are new records for the entire Caucasus. Of the 26 barcoded specimens representing 18 species, six species (*Agroeca maculata* L. Koch, 1879; *Aituaria eriashvilii* (Marusik, 1987); *Evippa sjostedti* Schenkel, 1936; *Lathys* cf. *lehtineni* Kovblyuk, Kastrygina & Omelko, 2014; *Zelotes segrex* (Simon, 1878); *Lathys lehtineni* Kovblyuk, Kastrygina & Omelko, 2014; *Maculoncus obscurus* Tanasevitch, Ponomarev & Chumachenko, 2016) are barcoded for the first time. In addition, 12 new regional records for 10 species are provided. The collecting information for each record is provided in detail, together with a discussion of the barcoding results and remarks, supported by 48 diagnostic drawings of 22 first-recorded species. A potential synonymy of *Pelecopsis odontophora* (Kulczyński, 1895) with *P. parallela* (Wider, 1834) and *Bassaniodes loeffleri* (Roewer, 1955) with *B. pseudorectilineus* (Wunderlich, 1995) is discussed.

Key words: Aranei, biodiversity, faunistic, new records, South Caucasus

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Introduction

The present survey marks the third contribution in the series of articles devoted to the study of Georgian spiders (Seropian et al. 2023a, b). Prior to the release of the first part of this series of studies, devoted to the diversity of spiders in Georgia and the Caucasus as a whole, the number of documented species in the country stood at 659. Recently this number has been replenished by 111 species and 27 genera, of which five genera and 24 species appeared to be new to the Caucasus and three species new to science were described. As a result spider diversity of Georgia increased to 766 species from 286 genera, comprising ≈65% of the known aranean diversity of the Caucasus (Otto 2023). While the faunistic exploration of Georgian araneofauna has undergone rela-

tively comprehensive investigations over the past five years, signifciant part of the country continue to remain inadequately explored, as new species (and families) are consistently being discovered (Deltshev et al. 2023; Seropian et al. 2023a, b; Deltshev et al. 2023; Zamani and Marusik 2024) showcasing the necessity of more targeted studies in the region. In this study, we provide records of an additional 23 species new to the fauna of Georgia, of which 11 taxa are recorded for the first time in the Caucasus.

Material and methods

Sampling

The main part of the studied material was collected within the framework of the Caucasus Barcode of Life (CaBOL) project, being the most ambitious arthropod inventories ever performed in Georgia by the members of the GGBC (Georgian-German Biodiversity Center) and the CaBOL team of the Ilia State University (https://ggbc.eu/). Most samples were collected during expeditions and short trips to different parts of Georgia (including both protected and unprotected areas) via aspirators, soil sifters, and hand collecting. Sampling details are given below. The elevations and GPS coordinates (given in WGS84) were obtained via Garmin GPS MAP 64s.

Collected specimens were preserved in 96% ethanol and stored in a freezer at -22˚C at the scientific collections of Ilia State University (Georgia, Tbilisi) and the Leibniz Institute for the Analysis of Biodiversity Change, Zoologisches Forschungsmuseum Alexander Koenig (ZFMK) (Germany, Bonn). Unique ID numbers of the preserved material (CaBOL-ID, ZFMK-TIS) indicate the depositories (Ilia State University and Zoologisches Forschungsmuseum Alexander Koenig, respectively). Identification was done by the authors using literature sources on Caucasian spiders (see list in Otto 2023) as well as Nentwig et al. (2023) and sources listed therein. For specimen identification, we used a Zeiss Stemi 508 Stereo Microscope with 8:1 Zoom and a Zeiss Apo 1.5x FWD 53 mm front lens attached. Drawings were made based on microscope photographs using a Wacom CTH-690 Intuos Medium Pen and Touch Tablet with the programs Krita (version 2.9.7) and Photoshop CS6 (version 13.0). Drawings usually show the left male palpus, the female epigyne, and the endogyne; perspective and scale bars are given in the plates and their captions. The preparation of the female epigyne and endogyne was done using a 30% solution of potassium hydroxide.

DNA processing

DNA extraction in ZFMK was performed by following the standard protocols of the GBOL (German Barcode of Life) project (Geiger et al. 2016; http://www.bol-germany.de). DNA extraction at ISU was performed following the customized protocol (Seropian et al. 2023a, b). Extracted DNA and remnants of the specimens were deposited at the ZFMK and scientific collections of Ilia State University, Tbilisi, Georgia, while the sequences were submitted to Barcode of Life Data Systems (BOLD) databases. The newly obtained DNA barcodes of COI sequences were checked against the BOLD Systems database (http://www.boldsystems.org/index.php). Barcode Index Number (BIN) (Ratnasingham and

Hebert 2013) for the sequenced taxa and their nearest neighbor in BOLD Systems (if they had a BIN) are also given. For the calculation of sequence differentiation, we used p-distance as performed in the BOLD Systems.

Results

In total, 142 (sub)adult spiders (including 46 males, 95 females, and 1 juvenile) collected during the sampling period were examined, comprising 33 species from 28 genera and 13 families. The 13 species marked with an asterisk (*) listed below are recorded in Georgia for the first time, additionally, 11 species marked with a double asterisk (**) represent the first records in the Caucasus. The list below is given in alphabetical order.

From the collected material submitted for barcoding, 59 quality barcodes (658 bp length barcodes, with no stop codons, indels, or deletions) representing 22 species have been generated so far, of which 12 barcodes (seven species) are the first ones of the species submitted to the BOLD Systems. Barcode information is given under each barcoded species listed below.

Abbreviations used are as follows: Mun. – mucipality; Vill. – village; NP – National Park.

List of spider species recorded

Family Agelenidae C.L. Koch, 1837
Genus *Tegenaria* Latreille, 1804

***Tegenaria lyncea* Brignoli, 1978**
Figs 1–3

Malthonica lyncea Guseinov, Marusik & Koponen, 2005: 165, figs 57–58, 63–68, 122–123 (♂♀).

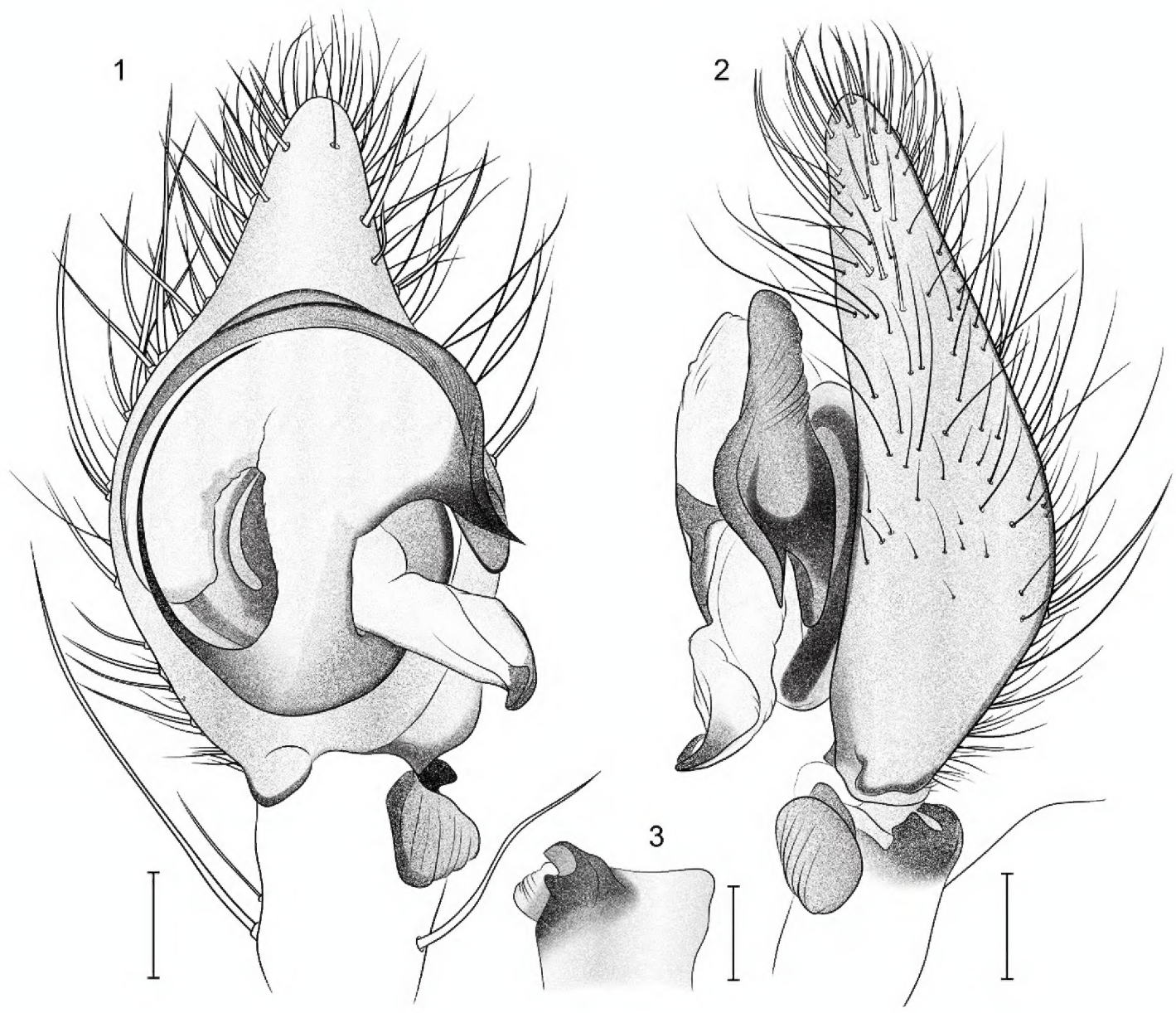
Material examined. GEORGIA – Kvemo Karlti • 1♂; Bolnisi mun., Tandzia Vill.; N41.4523°, E44.360511°; 915 m a.s.l.; meadow, under rocks; leg. Bulbulashvili N.; 16 Jun. 2023; CaBOL-ID 1035764.

Remarks. This species has an eastern Anatolian-Caucasian distribution range in the Caucasus, known from Azerbaijan and the North Caucasus (WSC 2023; Otto 2023). It is the first report of *T. lyncea* from Georgia. From the region congeners, it is closest to *T. pseudolyncea* (Guseinov, Marusik & Koponen, 2005), from which the males of *T. lyncea* are distinguished by a shorter embolus, thicker tegular apophysis, shorter prolateral arm of the conductor, and shape of the tibial apophysis.

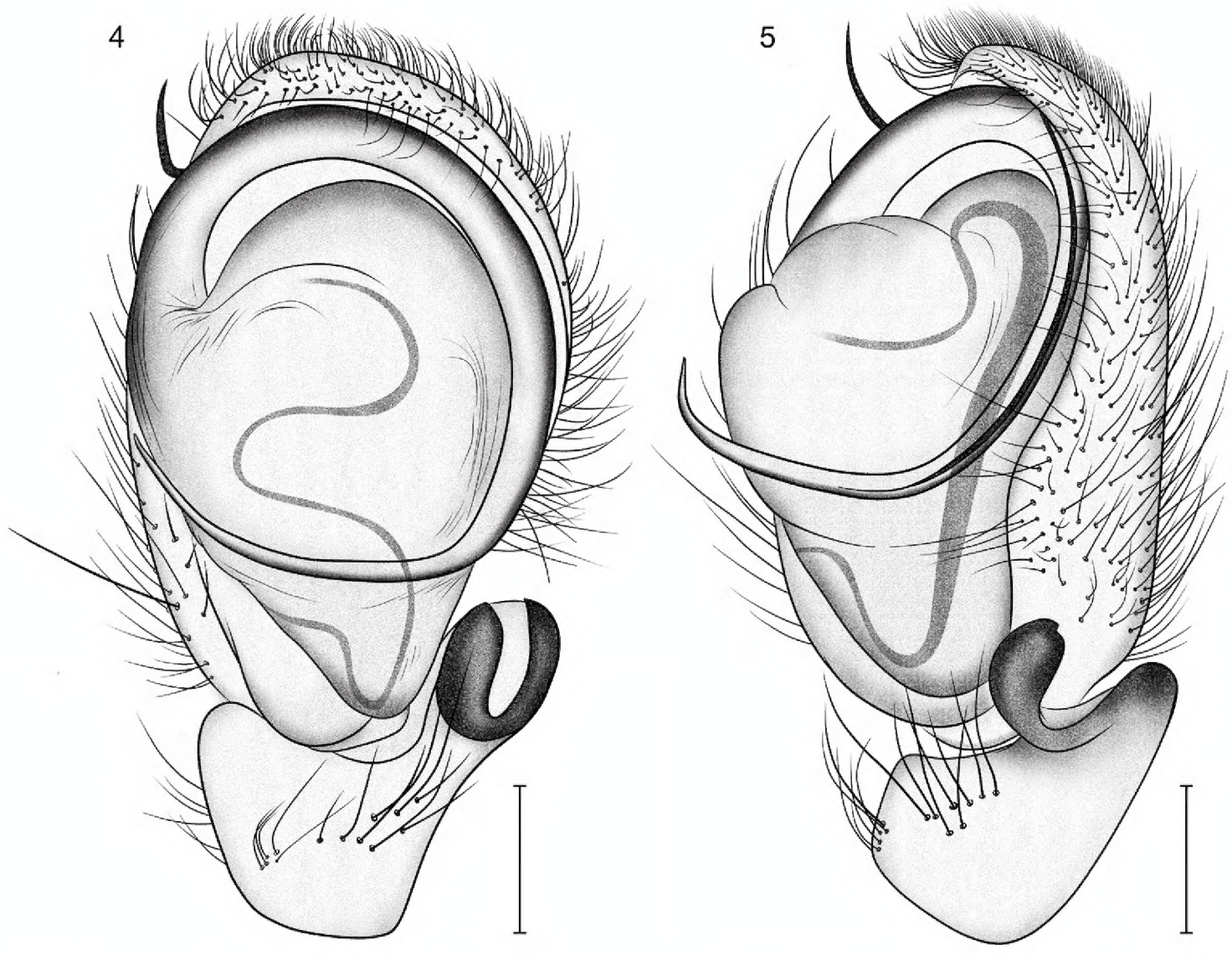
Family Clubionidae Simon, 1878
Genus *Clubiona* Latreille, 1804

***Clubiona frisia* Wunderlich & Schuett, 1995**
Fig. 6

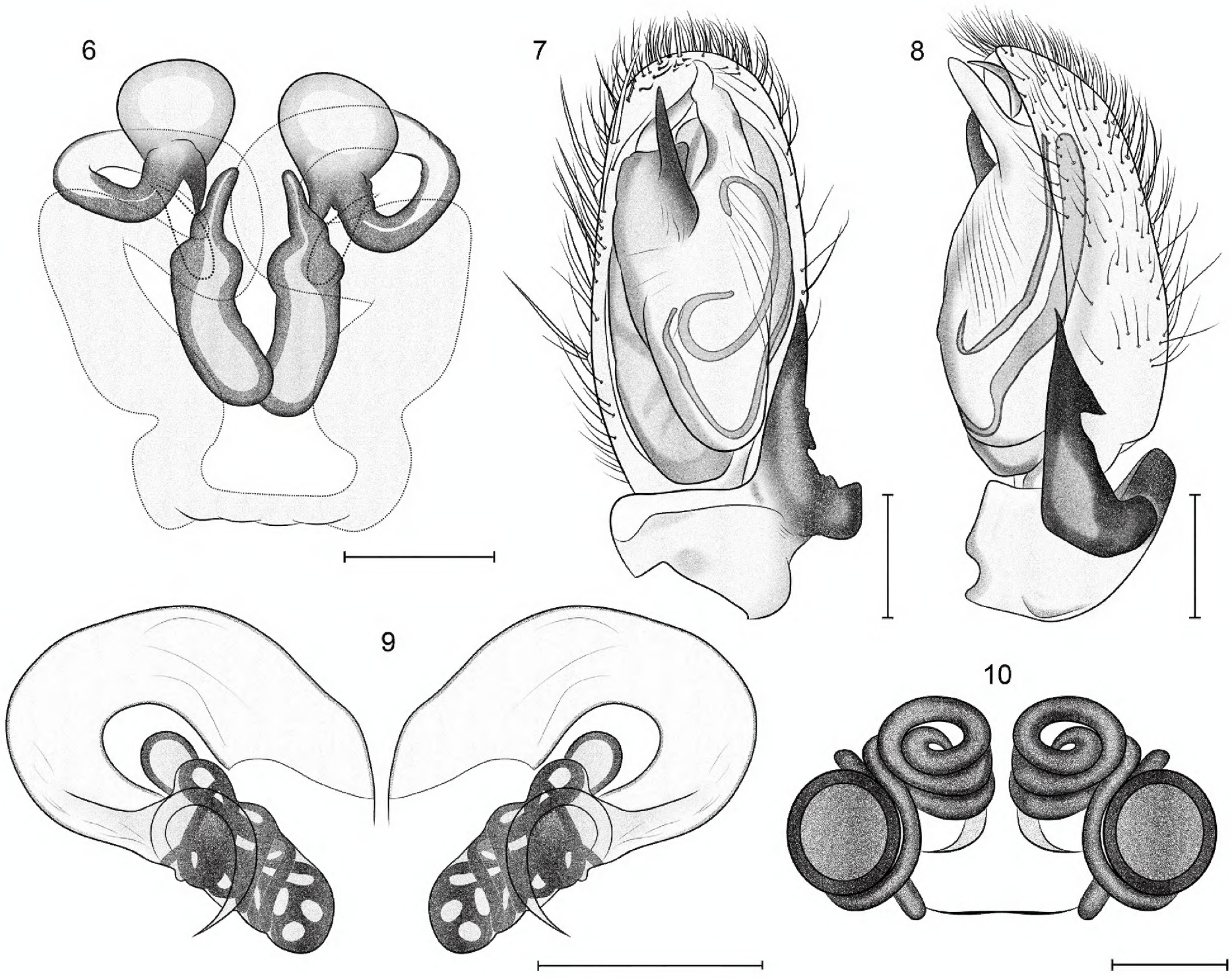
Clubiona frisia Wunderlich & Schuett, 1995: 12, figs 1–10 (♂♀).



Figures 1–3. *Tegenaria lyncea,* male (**1**: left palpus, ventral view; **2**: same, retrolateral view; **3**: tibial apophysis, dorsal view). Scale bars = 0.2 mm.



Figures 4–5. *Clubiona frisia,* male (**4**: left palpus, ventral view; **5**: same, retrolateral view). Scale bars = 0.2 mm.



Figures 6–10. *Clubiona frisia,* female (**6**: endogyne, dorsal view). *Clubiona reclusa,* male (**7**: left palpus, ventral view; **8**: same, retrolateral view). *Brigittea innocens*, female (**9**: endogyne, dorsal view). *Lathys lehtineni*, female (**10**: endogyne, dorsal view). Scale bars: 0.2 mm (6–9); 0.1 mm (10).

Material examined. GEORGIA – Samtskhe-Javakheti • 1♂; Borjomi mun., Tabatskuri L.; N41.66°, E43.613°; 2040 m a.s.l.; leg. Karalashvili E. & Krammer H.-J.; 23 Jul. 2019; ZFMK-TIS 8008386 (BOLD:AAU8188) (Figs 4–5). Mtskheta-Mtianeti • 2♀♀; Kazbegi mun., Stepantsminda; N42.655°, E44.649°; 1821 m a.s.l.; leg. Krammer H.-J. & Karalashvili E.; 7 Jul. 2019; ZFMK-TISs 8008063, 8008064 (BOLD:AAU8188) • 1♀; S of Stepantsminda; N42.637°, E44.631°; 1745 m a.s.l.; leg. Krammer H.-J. & Karalashvili E.; 5 Jul. 2019; ZFMK-TIS 8008084 (BOLD:AAU8188) • 1♀; N of Shevardeni, Mna Valley; N42.58°, E44.47°; 2012 m a.s.l.; leg. Krammer H.-J. & Karalashvili E.; 8 Jul. 2019; ZFMK-TIS 8008100 (BOLD:AAU8188).

Barcoding. Five barcodes were obtained from the specimens ZFMK-TISs 8008063, 8008064, 8008084, 8008100 and 8008386 (BOLD:AAU8188, mean *p*-distance 1.0%), with the nearest neighbor in BOLD Systems *C. frisia* from Norway (BOLD:AAU8188, 0.46%, 0.15%, 0.15%, 0.31%, 0.61% respective *p*-distances).

Remarks. This species is distributed from Spain east to West Siberia, north to the Scandinavian Peninsula, and south to Georgia (the record from Bulgaria is unpublished (Blagoev et al. 2018)) (Nentwig et al., 2023; Otto 2023). It is the first record of *C. frisia* from Georgia and the southernmost one within the

known range. Until Wunderlich and Schuett (1995), this species was treated as *C. similis*, from which the males of *C. frisia* are distinguished by a shorter distance between the embolus curvature and the tibial apophysis (best viewed in prolateral) (notably longer in *C. similis*), while the females have a longer receptacula seminis (shorter in *C. similis*).

****_Clubiona reclusa_ O. Pickard-Cambridge, 1863**
Figs 7–8

Clubiona reclusa Almquist - 2006: 374, figs 323a–f (♂♀).

Material examined. GEORGIA – Samtskhe-Javakheti • 1♂; Ninotsminda mun., Madatapa L.; N41.1794°, E43.7831°; 2100 m a.s.l.; subalpine meadow; leg. Balkhamishvili S., Ninua L., Daraselia I.; 31 May 2023; CaBOL-ID 1020850.

Remarks. This species is distributed from the Iberian Peninsula east to the Baikal and north to Torne lappmark (Sweden) (Nentwig et al. 2023; WSC 2023). It is the first record of *C. reclusa* in the Caucasus (Nentwig et al. 2023; Otto 2023; WSC 2023). *Clubiona reclusa* belongs to the *reclusa*-species group (for the species list, see Mikhailov 1995), from which *C. stagnatilis* Kulczyński, 1897 and *C. subsultans* Thorell, 1875, occur in the Caucasus (Nentwig et al. 2023; Otto 2023; WSC 2023). The males of this species group are characterized by a harpoon-shaped ventral process of the tibial apophysis and the presence of a protector on the bulb. Males of *C. reclusa* are distinguished from those of *C. stagnatilis* and *C. subsultans* by the shape of the conductor (conductor broad, with bifurcated top in *C. subsultans*; prolateral margin of conductor deeply grooved near apical part in *C. stagnatsilis*), shape and placement of the tegular apophysis (small-sized, strongly curved outwards conductor in *C. stagnatsilis*; medium-sized, straight, originating at about 11 o'clock in *C. subsultans*; large, straight, originating at about 12 o'clock in *C. reclusa*), and shape of the tibial apophysis.

Family Dictynidae O. Pickard-Cambridge, 1871
Genus _Brigittea_ Lehtinen, 1967

****_Brigittea innocens_ (O. Pickard-Cambridge, 1872)**
Fig. 9

Brigittea innocens Lecigne, 2021: 13, figs 4a–i, 5a–h, 6a–e (♂♀).

Material examined. GEORGIA – Kakheti • 2♀♀; Dedoplistskaro mun., Chachuna Managed Reserve; N41.225185°, E46.323604°; 648 m a.s.l.; semidesert, vegetation; leg. Seropian A.; 18 Jul. 2023; CaBOL-IDs 1035877, 1035878.

Barcoding. Two barcodes were obtained from the specimens CaBOL-IDs 1035877 and 1035878 (BOLD:AFO9424, mean *p*-distance 1.37%). According to the BOLD Systems library, there are 2 barcodes of the species currently with a private status that failed to indicate a good match with our specimens. Either the specimens in the BOLD Systems belong to other species, or the COI gene is not a proper tool to differentiate this particular species.

Remarks. This species is distributed from the eastern Mediterranean to eastern Kazakhstan (Nentwig et al. 2023; WSC 2023). It is the first record of *B. innoscens* in the Caucasus. The nearest known record originates from Cyprus (Bosmans et al. 2019), while in the neighboring countries, this species is recorded in Antalya (Turkey) (Lecigne 2021; see also for female diagnosis).

Brigittea latens Fabricius, 1775

Brigittea latens Marusik, Esyunin & Tuneva, 2015: 136, figs 31-36, 40–42 (♂)

Material examined. GEORGIA – Kakheti • 5♂♂; Dedoplistskaro mun., Vashlovani NP, Mijniskure; N41.1127°, E46.6460°; 101 m a.s.l.; semidesert, light trap; leg. Kaitila J.-P. & Junnilainen J.; 22. May 2023; CaBOL-IDs 1035765, 1035766, 1035767, 1035817, 1035818 • 1♀; Vashlovani NP; N41.214°, E46.537°; 388 m a.s.l.; leg. Karalashvili E. & Krammer H.-J.; 10 Jul. 2019; ZFMK-TIS 8008402 (BOLD:AAO1681). Kvemo Kartli • 2♀♀; Gardabani mun., Kumisi L.; N41.577°, E44.824°; 476 m a.s.l.; leg. Karalashvili E. & Krammer H.-J.; 16 Jul. 2019; ZFMK-TISs 8008367, 8008368 (BOLD:AAO1681).

Barcoding. Three barcodes were obtained from the specimens ZFMK-TISs 8008367, 8008368, and 8008402 (BOLD:AAO1681, mean *p*-distance 1.52%), with the nearest neighbor in BOLD Systems *B. latens* from Spain (maximum *p*-distance 0.61%) currently at private status.

Remarks. This species is distributed from the Iberian Peninsula east to eastern Kazakhstan and north to Steinkjer (Norway) (WSC 2023). In the Caucasus, it is reported from Azerbaijan, the North-East Caucasus, and Georgia (Samachablo region) (Otto 2023). It is the first record of *B. latens* from the Kakheti and Kvemo Kartli regions.

Genus *Lathys* Simon, 1884

****Lathys* cf. *lehtineni* Kovblyuk, Kastrygina & Omelko, 2014**

Fig. 10

Lathys lehtineni Kovblyuk, Kastrygina & Omelko, 2014: 195, figs 1–8 (♂♀).

Material examined. GEORGIA – Mtskheta-Mtianeti • 2♀♀; N of Shevardeni, Mna Valley; N42.58°, E44.47°; 2012 m a.s.l.; leg. Krammer H.-J. & Karalashvili E.; 7 Jul. 2019; ZFMK-TISs 8008109, 8008110 (BOLD:AFJ0262).

Barcoding. Two identical barcodes were obtained from the specimens ZFMK-TISs 8008109 and 8008110 (BOLD:AFJ0262). The identification via the COI gene was not straightforward, as the best match is *Lathys alberta* Gertsch, 1946, from Canada (BOLD:AAK7771, *p*-distance 2.29%). There are currently no barcodes for *L.* cf. *lehtineni* in BOLD Systems; we are submitting the first ones.

Remarks. This species was described from Ukraine (Crimea) and Russia (Astrakhan and Rostov regions) and also occurs in Kazakhstan (Nentwig et al. 2023; WSC 2023). Potential records from Turkey and Iran (Danışman et al. 2014; Zamani et al. 2020) need verification. It is the first record of *L. lehtineni* in the

Caucasus. Although the examined material fits well with the original description of the species (Kovblyuk et al. 2014), identification by singleton females is not reliable and shall be confirmed after the male specimen is available.

Family Gnaphosidae Banks, 1892
Genus *Haplodrassus* Chamberlin, 1922

***Haplodrassus kulczynskii* Lohmander, 1942**

Haplodrassus kulczynskii Kovblyuk, Kastrygina & Omelko, 2012: 73, figs 35–39 (♂♀).

Material examined. GEORGIA – Tbilisi • 1♀; Telovani Vill.; N41.8023°, E44.6768°; 923 m a.s.l.; meadow, under rocks; leg. Bulbulashvili N.; 27 May 2023; CaBOL-ID 1035524.

Remarks. This species is distributed from France to East Asia (Nentwig et al. 2023; WSC 2023) with records in the Caucasus from Georgia (Samachablo region) and the North Caucasus. It is the first record of *H. kulczynskii* from Tbilisi and the second in the country.

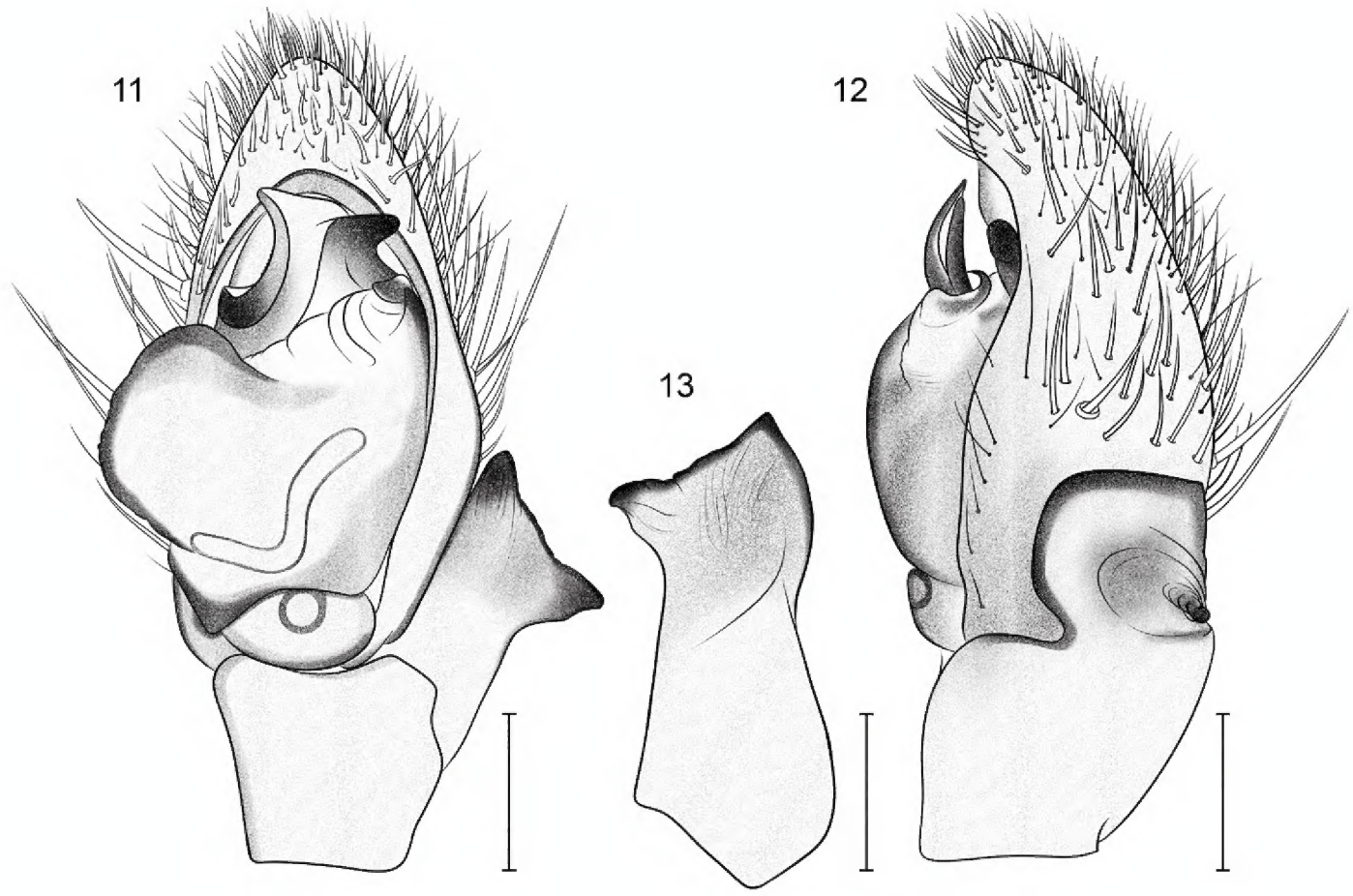
Genus *Nomisia* Dalmas, 1921

***Nomisia ripariensis* O. Pickard-Cambridge, 1872**
Figs 11–13

Nomisia ripariensis Levy, 1995: 931, figs 26–30 (♂♀).
Nomisia ripariensis Ponomarev et al., 2019: 316, fig. 10 (♂).

Material examined. GEORGIA – Kakheti • 6♂♂; Dedoplistskaro mun., Vashlovani NP, Mijniskure; N41.1127°, E46.6460°; 101 m a.s.l.; semidesert, the light trap; leg. Kaitila J.-P. & Junnilainen J.; 22 May 2023; CaBOL-IDs 1035768, 1035775, 1035790, 1035810, 1035811, 1035822. Kvemo Kartli • 1♀; Marneuli mun., Shulaveri; N41.3681°, E44.8219°; 479 m a.s.l.; under rocks in steppe; leg. Seropian A., Bulbulashvili N. & Zukakishvili A.; 3 Jun. 2023; CaBOL-ID 1020862.

Remarks. This species is distributed from the eastern Mediterranean north to Dagestan and east to Iran (Nentwig et al. 2023; WSC 2023). In the Caucasus, it is reported from a single locality in Dagestan and several localities in Azerbaijan (Otto 2023). It is the first record of *N. ripariensis* from Georgia. The examined material originates from the Georgian-Azerbaijani border, although the nearest record to our specimens is from Dagestan. Males of *N. ripariensis* are most similar to those of co-occurring in the Caucasus and Georgia *N. conigera* (Spassky, 1941), from which they are distinguished by a shorter retrolateral tibial apophysis (longer in *N. conigera*), a shorter and more oblique prolateral arm of the conductor (distinctly protruding and conical in *N. conigera*), and shape of the embolus (distinctly longer than wide in *N. conigera*; width and length approximately the same in *N. ripariensis*). Females are most similar to those of *N. exornata* (C.L. Koch, 1839) and *N. excerpta* (O. Pickard-Cambridge, 1872), but differ in the shape of the receptaculum seminis.



Figures 11–15. *Nomisia ripariensis*, male (**11**: left palpus, ventral view; **12**: same, retrolateral view; **13**: tibial apophysis, dorsal view). *Poecilochroa senilis*, male (**14**: left palpus, ventral view; **15**: same, retrolateral view). Scale bars = 0.2 mm.

Genus *Marinarozelotes* Ponomarev, 2020

Marinarozelotes malkini (Platnick & Murphy, 1984)

Marinarozelotes malkini Ponomarev & Shmatko, 2020: 135, figs 14–15, 19, 25–26, 43–44, 64–65 (♂♀).

Material examined. GEORGIA – Tbilisi • 1♀; Dighomi vill.; N41.778°, E44.701°; 716 m a.s.l.; *Paliurus spina-christi* dominated shrubland, under rocks; leg. Se-

ropian A., Krammer H.-J. & Karalashvili E.; 17 Jul. 2019; ZFMK-TIS 8008317 (BOLD:AAO4464).

Bacroding. A single barcode was obtained from the specimen ZFMK-TIS 8008317 (BOLD:AAO4464) with the nearest neighbor in BOLD Systems *M. malkini* from Bulgaria (*p*-distance 0.15%) with an Early-Release status.

Remarks. This species is distributed in the Balkans, Greece, the Caucasus (except for Armenia), the Asian part of Turkey, Iran, and Kazakhstan (Nentwig et al. 2023; WSC 2023). The record from Azerbaijan (Ponomarev and Shmatko 2020) is missing in Otto (2023). It is the second record for *M. malkini* in Georgia, the first record was from the Samachablo region (Otto 2023).

Genus *Poecilochroa* Westring, 1874

**Poecilochroa senilis* (O. Pickard-Cambridge, 1872)

Figs 14–15

Poecilochroa senilis Murphy, 2007: 50, figs 370–371 (♂♀).
Poecilochroa senilis Bosmans & Gavalas, 2023: 50, figs 26A–D (♂♀).

Material examined. GEORGIA – Kakheti • 1♂; Dedoplistskaro mun., Chachuna Managed Reserve; N41.230663°, E46.140872°; 648 m a.s.l.; semidesert, under rocks; leg. Seropian A.; 19 Jul. 2023; CaBOL-ID 1035879.

Barcoding. A single barcode was obtained from the specimen CaBOL-ID1035879 (BOLD:ABW8614). According to the BOLD Systems library, there is a single public barcode of the species mined from the GenBank, with 518 bp length, that failed to indicate a good match with our specimens. Either the specimen in the BOLD Systems belongs to another species, or the COI gene is not a proper tool to differentiate this particular species.

Remarks. This species is distributed from the Eastern Mediterranean east to Turkmenistan (Nentwig et al. 2023; WSC 2023). In the Caucasus, it is reported only from NE Caucasus (Otto 2023). It is the first record of *P. senilis* in Georgia and the South Caucasus. The males of this species are easily distinguished from other local congeners by the shape of the retrolateral tibial apophysis.

Genus *Zelotes* Gistel, 1848

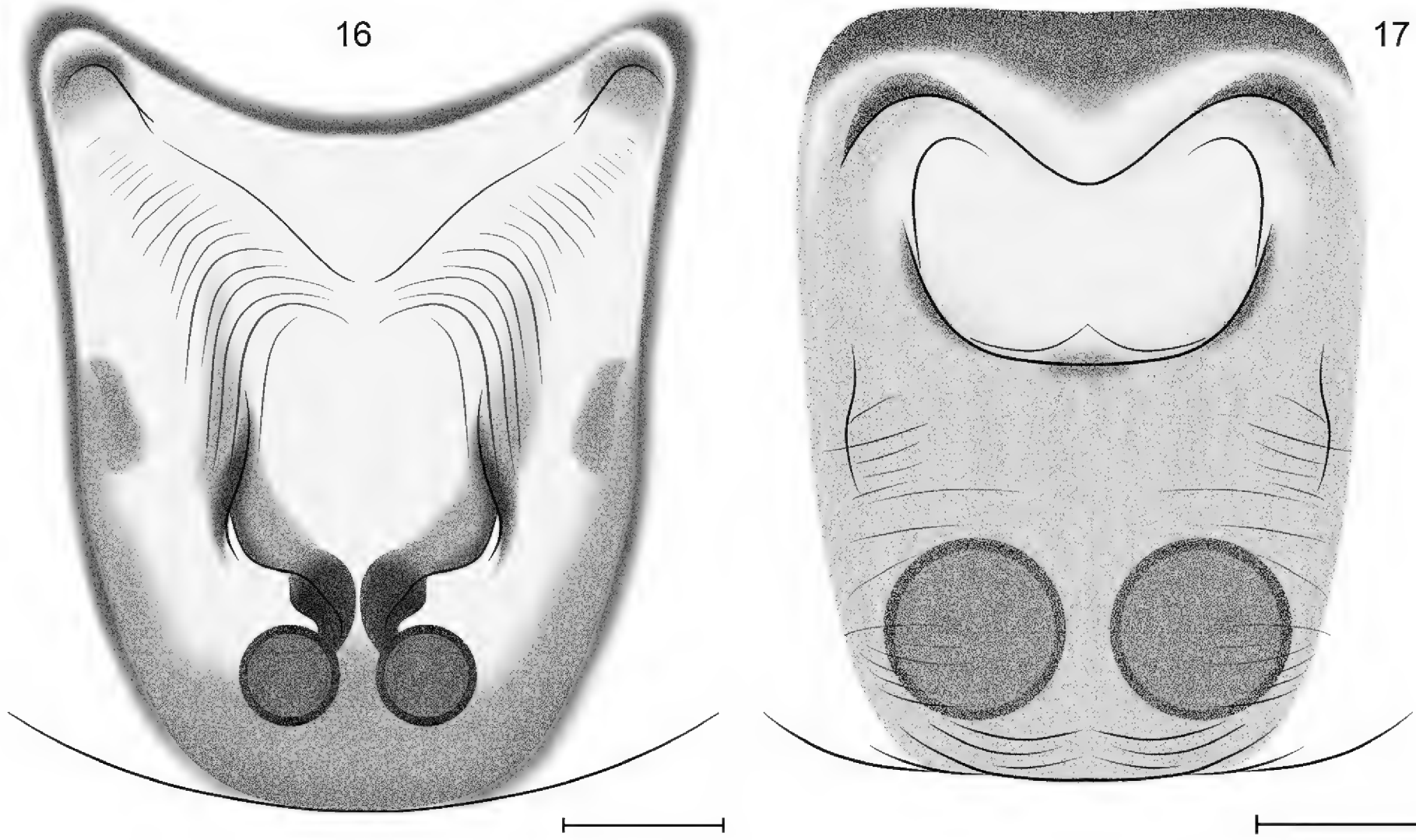
**Zelotes latreillei* (Simon, 1878)

Fig. 16

Zelotes latreillei Almquist, 2006: 426, figs 367a–e (♂♀).

Material examined. GEORGIA – Samtskhe-Javakheti • 1♀; Borjomi mun., Tabatskuri L.; N41.66°, E43.613°; 2040 m a.s.l.; leg. Krammer H.-J. & Karalashvili E.; 23 Jul. 2019; ZFMK-TIS 8008390 (BOLD:ABZ4051). Mtskheta-Mtianeti • 1♀; Kazbegi mun., Stepantsminda; N42.667°, E44.614°; 2100 m a.s.l.; leg. Klug T.; 7 Jul. 2019; ZFMK-TIS 8008619 (BOLD:ABZ4051).

Bacroding. Two barcodes were obtained from the specimens ZFMK-TISs 8008317 and 8008619 (BOLD:ABZ4051, *p*-distance 0.91%) with the nearest neigh-



Figures 16–17. *Zelotes latreillei*, female (**16**: epigyne, ventral view). *Zelotes segrex*, female (**17**: epigyne, ventral view). Scale bars = 0.2 mm

bors in BOLD Systems *Z. latreillei* from Finland, Austria, and Germany (BOLD:ABZ4051, *p*-distance 0.76% and 0.77%, respectively). The second-best match is *Z. latreillei* from Slovenia (BOLD:ABZ4051, *p*-distance 0.77% and 0.78%, respectively).

Remarks. This species is distributed from the Iberian Peninsula east to Yenisei and north to the Scandinavian Peninsula (Marusik et al. 2001; Nentwig et al. 2023; WSC 2023). In the Caucasus, it is known from the North Caucasus and Azerbaijan (Otto 2023). It is the first record of *Z. latreillei* from Georgia.

**Zelotes segrex* (Simon, 1878)

Fig. 17

Zelotes labilis Di Franco, 2002: 199, figs 13–16 (♂♀).
Zelotes segrex Gaymard & Lecigne, 2018: 21, figs 14C–E (♀).

Material examined. GEORGIA – Tbilisi • 1♀; Dighomi cemetery; N41.771°, E44.767°; 446 m a.s.l.; leg. Karalashvili E., Krammer H.-J. & Seropian A.; 17 Jul. 2019; ZFMK-TIS 8008381 (BOLD:AFI9929).

Bacroding. A single barcode was obtained from the specimen ZFMK-TIS 8008381 (BOLD:AFI9929). There are currently no barcodes of this species in BOLD Systems, we are submitting the first one.

Remarks. This species is distributed from the Iberian Peninsula to Kazakhstan (Nentwig et al. 2023; WSC 2023). In the Caucasus, it is reported from the North Caucasus and Azerbaijan (Otto 2023). It is the first record of *Z. segrex* from Georgia.

Family Linyphiidae Blackwall, 1859
Genus *Maculoncus* Wunderlich, 1995

***Maculoncus obscurus* Tanasevitch, Ponomarev & Chumachenko, 2016**

Maculoncus (?) *obscurus* Tanasevitch, Ponomarev & Chumachenko, 2016: 426, figs 10–16 (♂).

Material examined. GEORGIA – Racha-Lechkhumi and Kvemo Svaneti • 1♂; Oni mun., Tskhmori Vill.; N42.53125°, E43.470933°; 1269 m a.s.l.; deciduous forest, litter sifting; leg. Astrin J.; 18 Jul. 2018; ZFMK-TIS 8005081 (BOLD:AFJ0696).

Bacroding. A single barcode was obtained from the specimen ZFMK-TIS 8005081 (BOLD:AFJ0696). There are currently no barcodes for *M. obscurus* in BOLD Systems, we are submitting the first one.

Remarks. *Maculoncus obscurus* is endemic to the Caucasus (Nentwig et al. 2023; WSC 2023), where it is reported from Adygea (*terra typica*) and Georgia (Imereti region, Mukhura Vill.). It is the first record of this species in the Racha-Lechkhumi and Kvemo Svaneti and the third in the region. The female of *M. obscurus* is unknown.

Genus *Metopobactrus* Simon, 1884

***Metopobactrus prominulus* (O. Pickard--Cambridge, 1872)**

Metopobactrus prominulus Roberts, 1987: 46, figs 14c, 17c (♂♀).
Metopobactrus prominulus Crespo et al., 2018: 166, figs 7a–h (♂♀).

Material examined. GEORGIA – Mtskheta-Mtianeti • 1♀; Kazbegi mun., Stepantsminda; N42.655°, E44.649°; 1821 m a.s.l.; leg. Krammer H.-J. & Karalashvili E.; 7 Jul. 2019; ZFMK-TIS 8008075 (BOLD:AFI9848).

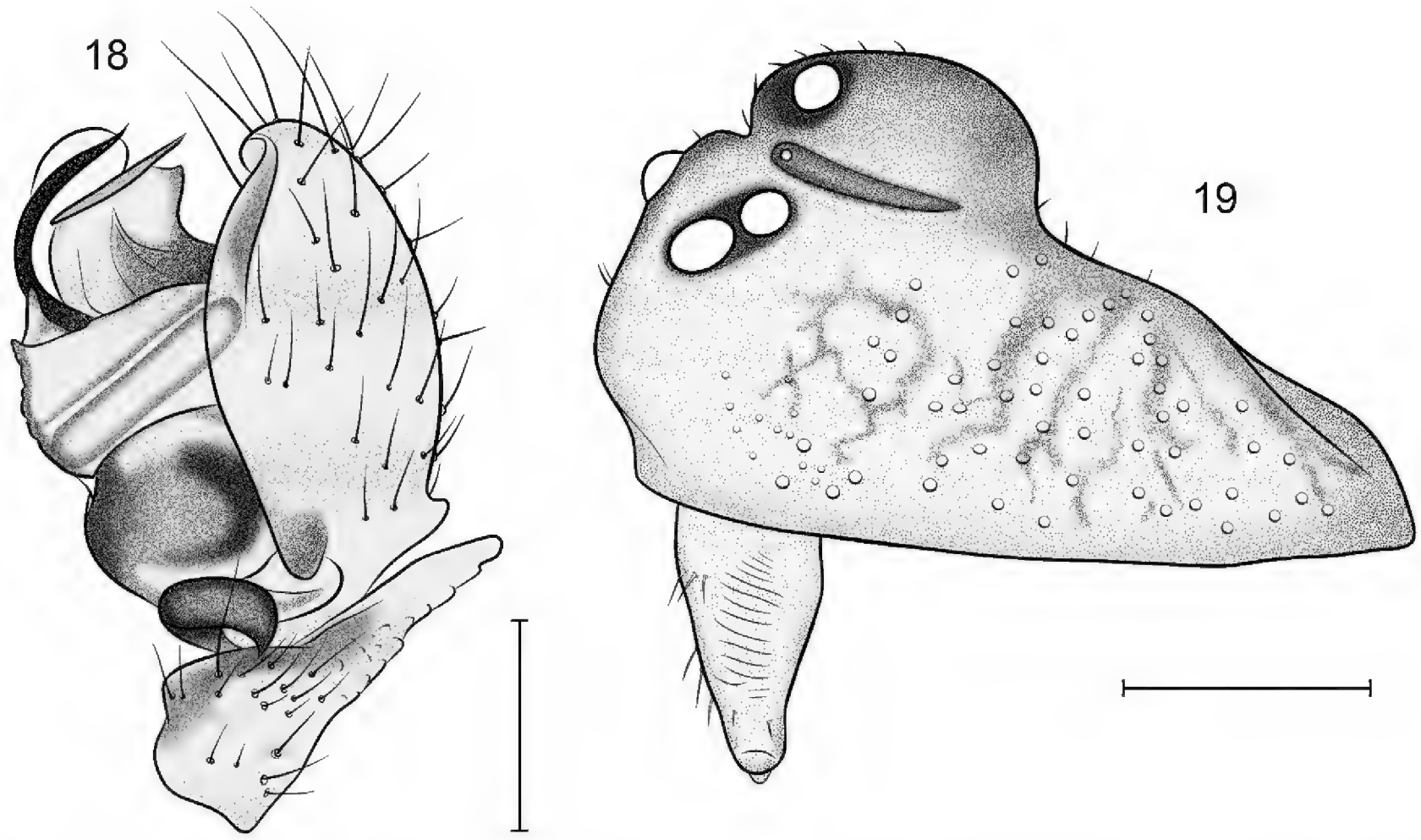
Bacroding. A single barcode was obtained from the specimen ZFMK-TIS 8008075 (BOLD:AFI9848) with the nearest neighbor in BOLD Systems *M. prominulus* from Georgia (*p*-distance 1.08%) with private status. The second-best match is *M. prominulus* from Turkey (*p*-distance 1.23%) with early-release status.

Remarks. This species has a holarctic distribution (Nentwig et al. 2023; WSC 2023). In Georgia, it was known solely from Abkhazia (Kovblyuk et al. 2011). It is the first record of *M. prominulis* in the Mtskheta-Mtianeti region.

Genus *Pelecopsis* Simon, 1864

****Pelecopsis parallela* Wider, 1834**
Figs 18-19

Pelecopsis parallela Roberts, 1987: 61, figs 23h, 24d (♂♀).
Pelecopsis parallela Marusik, Koponen & Danilov, 2001: 87, figs 25–26, 31–32 (♂).



Figures 18–19. *Pelecopsis parallela*, male (**18**: left palpus, retrolateral view; **19**: carapace, lateral view). Scale bars: 0.1 mm (18); 0.2 mm (19).

Material examined. GEORGIA – Shida Kartli • 1♂; Gori, Kvernaki ridge, Gori; N41.9833°, E44.1494°; 641 m a.s.l.; *Paliurus spina-christi* dominated shrubland, under rocks; leg. Bulbulashvili N.; 08 April 2023; CaBOL-ID 1035448.

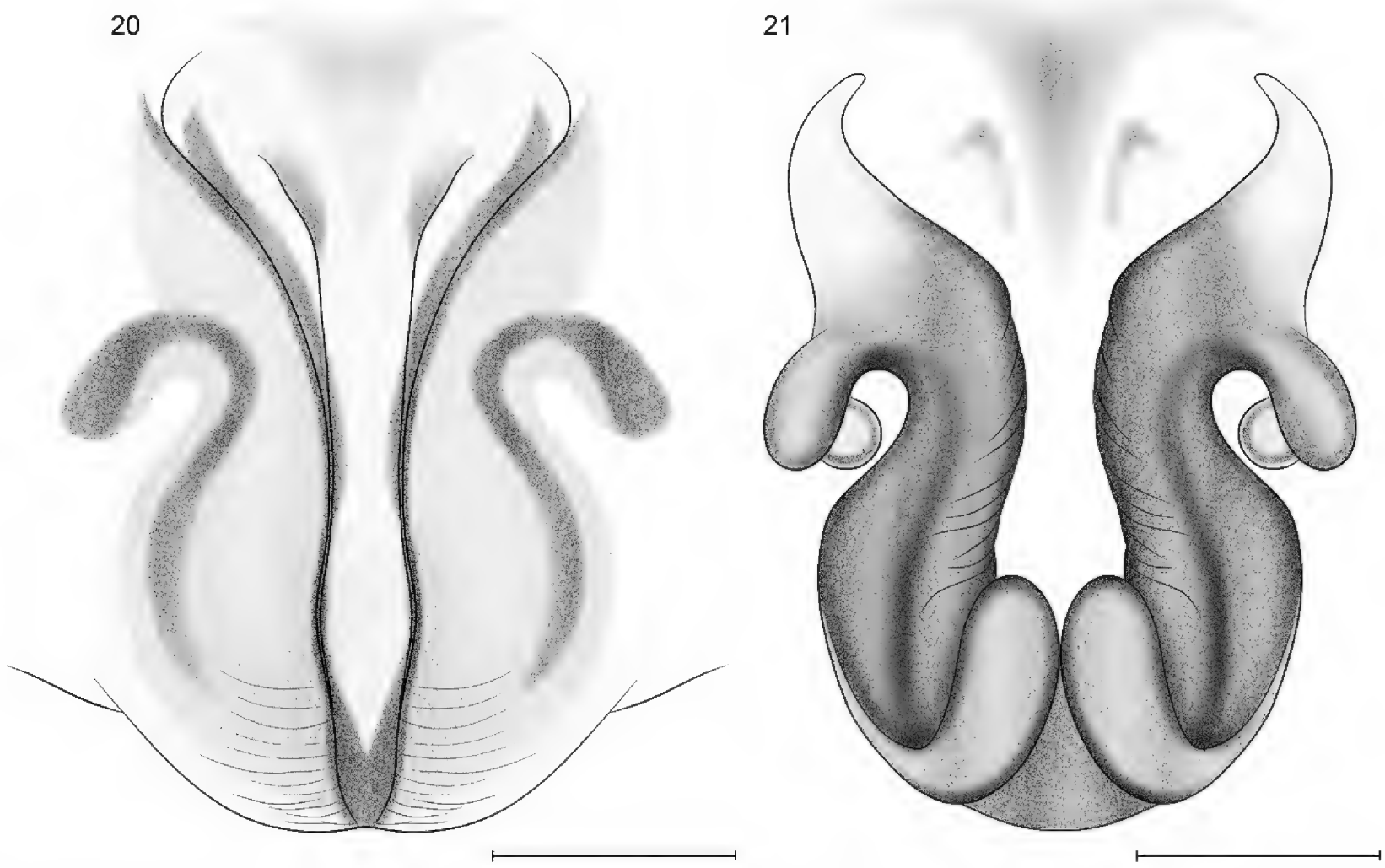
Remarks. Transpalaearctic species, also occurring in West Greenland (WSC 2023). It is the first record of *P. parallela* in the Caucasus. Males of *P. parallela* are distinguished from those of co-occurring in the Caucasus *P. crassipes* Tanasevitch, 1987 by its flat, 1/2 as high as long cephalic lobe of the carapace (round and high in *P. crassipes*) and the absence of long frontal outgrowth on the tegulum (present in *P. crassipes*). Another species, *P. odontophora* (Kulczyński, 1895), similar to *P. parallela*, can be distinguished by the presence of a rounded projection in the proximal part of the cymbium (absent in *P. parallela*) (Tanasevitch 1990). A male from Gori resembles *P. parallela* but has a rounded projection, suggesting *P. odontophora* might be a junior synonym of *P. parallela*. Further examination of the holotype specimen and local specimens is needed to confirm this.

Family Liocranidae Simon, 1897
Genus *Agroeca* Westring, 1861

**Agroeca maculata* L. Koch, 1879
Figs 20–21

Agroeca maculata Danilov, 1999: 313, figs 1D–E (♀).

Material examined. GEORGIA – Mtskheta-Mtianeti • 1♀; N of Shevardeni, Mna Valley; N42.58°, E44.47°; 2012 m a.s.l.; leg. Krammer H.-J..; 7 Jul. 2019; ZFMK-TIS 8008097 (BOLD:AFJ0323).



Figures 20–21. *Agroeca maculata*, female (**20**: epigyne, ventral view, in situ; **21**: endogyne, dorsal view). Scale bars = 0.2 mm.

Barcoding. A single barcode was obtained from the specimen ZFMK-TIS 8008097 (BOLD:AFJ0323) with the nearest neighbor in BOLD Systems. There are currently no barcodes for *A. maculata* in BOLD Systems, we are submitting the first one.

Remarks. Species with a Western-Palaearctic distribution range occur from Ukraine east to the Irkutsk Oblast of Russia (Nentwig et al. 2023; WSC 2023). In the Caucasus, it is known only from Dagestan (Otto 2023). It is the first record of *A. maculata* in Georgia. Females of the species are readily distinguished from the females of other Palaearctic congeners by the shape of epigyne and endogyne.

Genus *Apostenus* Westring, 1851

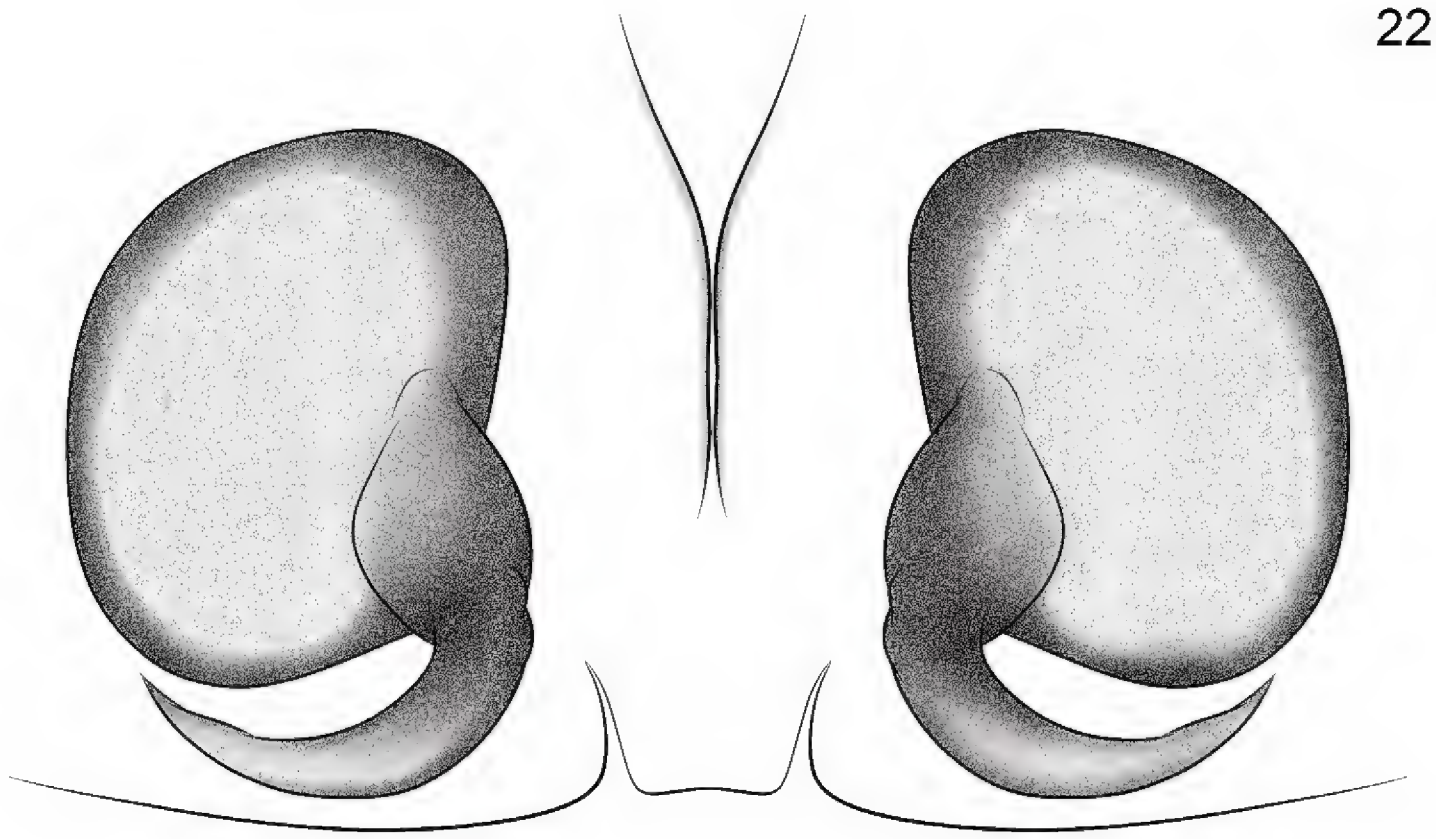
****Apostenus* cf. *humilis* Simon, 1932**

Fig. 22

Apostenus humilis Bosselaers, 2009: 39, figs 1A–E, 2B–C, 8A (♂♀).

Material examined. GEORGIA – Shida Kartli • 1♀; Gori, Kvernaki ridge; N41.9834°, E44.1495°; 641 m a.s.l.; *Paliurus spina-christi* dominated shrubland, under rocks; leg. Bulbulashvili N.; 04 April 2023; CaBOL-ID 1035450. • 1♀; N41.9833°, E44.1504°; 493 m a.s.l.; *Paliurus spina-christi* dominated shrubland, under rocks; leg. Bulbulashvili N.; 20 May 2023; CaBOL-ID 1035493.

Remarks. The examined material seems to correspond to the description (pale, unicolored, patternless abdomen) and drawings by Bosselaers (2009). It has a simple morphology, and identification by singleton females leaves some doubts, thus the male specimen is required for verification.



Figures 22. *Apostenus humilis*, female, endogyne, dorsal view. Scale bar = 0.1 mm.

Family Lycosidae Sundevall, 1833
Genus *Evippa* Simon, 1882

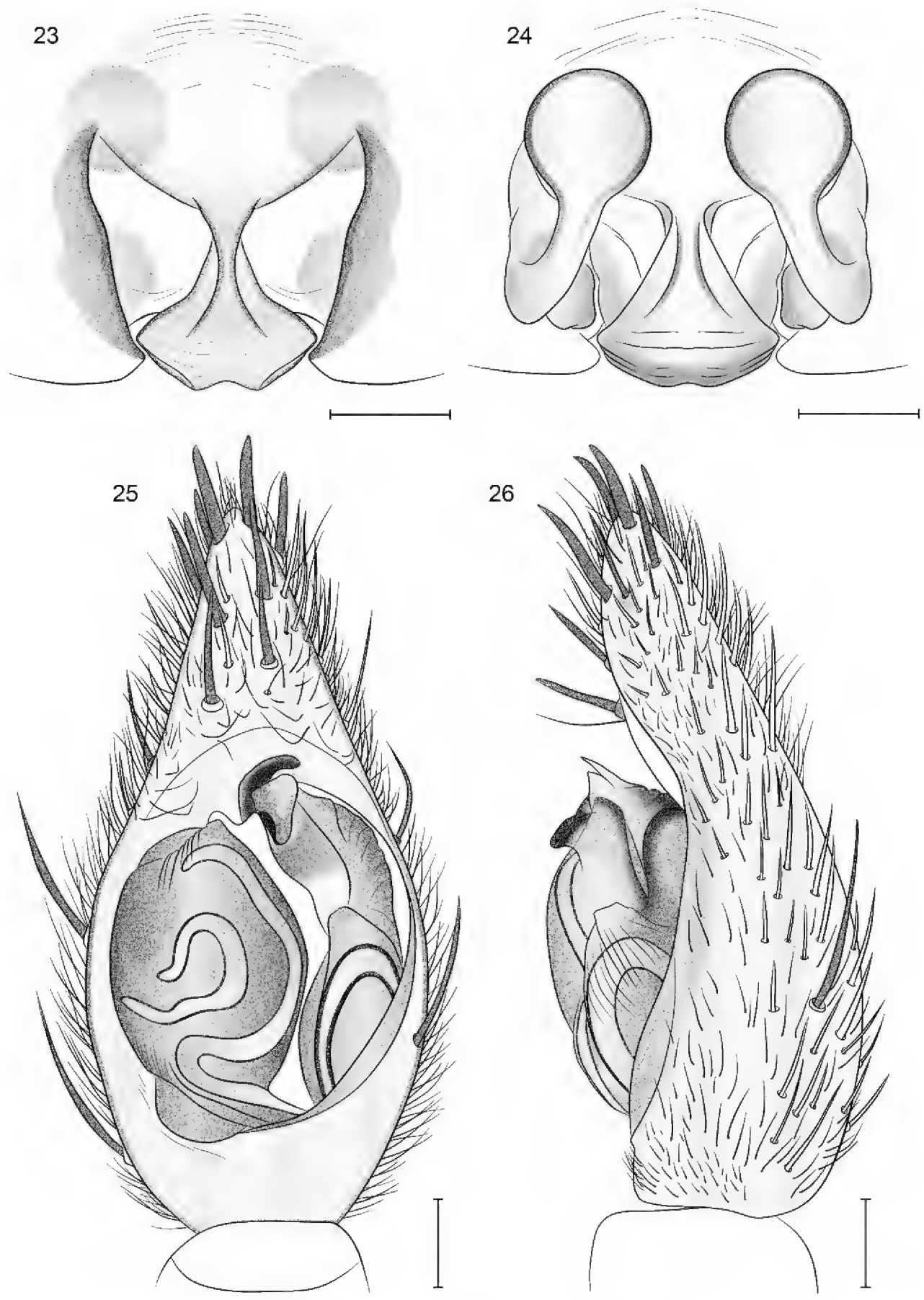
****Evippa sjostedti* Schenkel, 1936**
Figs 23–26

Evippa sjostedti Marusik, Guseinov & Koponen, 2003: 50, figs 30–34 (♂♀).
Evippa sjostedti Zhang, Peng & Zhang, 2022: 130, figs 94A–H (♂♀).
Evippa sjostedti Esyunin & Kabdrakhimov, 2023: 22, fig. 2A (♀).

Material examined. GEORGIA – Kakheti • 1♀; Dedoplistskaro mun., Vashlovani NP, Pantishara Gorge; N41.2400°, E46.3847°; 459 m a.s.l.; semidesert, rocks; leg. Seropian A.; 16 Apr. 2021; CaBOL-ID 1010010. • 3♂♂; Mijniskure; N41.1127°, E46.6460°; 101 m a.s.l.; semidesert, light trap; leg. Kaitila J.-P. & Junnilainen J.; 22 May 2023; CaBOL-IDs 1035789, 1035813, 1035814 • 1♀; Chachuna Managed Reserve; N41.213086°, E46.015515°; 648 m a.s.l.; semidesert; leg. Seropian A.; 16 Jul. 2023; CaBOL-ID 1035907.

Barcoding. Two barcodes were obtained from the specimens CaBOL-IDs 1010010 and 1035907 (BOLD:AFK2385, *p*-distance 1.06%), with the nearest neighbor in BOLD Systems being an Asian species, *Evippa onager* Simon, 1895 from Israel (BOLD:AEK4432, *p*-distance 7.62%). There are currently no barcodes for *E. sjostedti* in BOLD Systems; we are submitting the first ones.

Remarks. *Evippa sjostedti* is distributed in western Kazakhstan, southern Mongolia, and central China (WSC 2023). It is the first record of this species in the Caucasus. Along with *E. turkmenica* Sternbergs, 1979 (description based only on females), it belongs to the *sjostedti*-group. The females of *E. sjostedti* can be distinguished from those of *E. turkmenica* by the angled anterior hood (almost straight in *E. turkmenica*).



Figures 23–26. *Evippa sjostedti* (**23**: female, epigyne, ventral view, in situ; **24**: endogyne, dorsal view; **25**: male, left palpus, ventral view; **26**: same, retrolateral view). Scale bars = 0.2 mm.

Family Miturgidae Simon, 1886
Genus *Zora* C.L. Koch, 1847

***Zora nemoralis* (Blackwall, 1861)**

Material examined. GEORGIA – Mtskheta-Mtianeti • 1♀; Akhmeta mun., NW of Vedzebi Vill.; N42.064°, E45.064°; 1036 m a.s.l.; leg. Karalashvili E. & Krammer H.-J.; 08 July 2019; ZFMK-TIS 8008338 (BOLD:AAG5679).

Barcoding. A single barcode was obtained from the specimen ZFMK-TIS 8008338 (BOLD:AAG5679) with the nearest neighbor in BOLD Systems *Z. nemoralis* from Slovenia, Bulgaria, and Finland (BOLD:AAG5679, *p*-distance 1.54%).

Remarks. This species has a transpalaearctic range (Nentwig et al. 2023; WSC 2023). It is a common species in the Caucasus, recorded in Azerbaijan, the North Caucasus, and Georgia (Samachablo region) (Otto 2023). Herein, *Z. nemoralis* is reported from the Mtskheta-Mtianeti region for the first time.

Family Nesticidae Simon, 1894
Genus *Aituaria* Esyunin & Efimik, 1998

***Aituaria eriashvilii* (Marusik, 1987)**

Carpatonesticus eriashvilii Marusik, 1987: 462, fig. 3 (♀).
Carpathonesticus eriashvilii Marusik et al., 2017: 302, figs 1–6, 8–17, 23–33, 38–40 (♂♀).

Material examined. GEORGIA – Tbilisi • 1♂; W of Kojori; N41.67°, E44.669°; 1308 m a.s.l.; mixed forest, leg. Karalashvili E. & Krammer H.-J.; 15 Jul. 2019; ZFMK-TIS 8008275 (BOLD:AFJ0298).

Barcoding. A single barcode was obtained from the specimen ZFMK-TIS 8008275 (BOLD:AFJ0298). There are currently no barcodes for *A. eriashvilii* in BOLD Systems, we are submitting the first one.

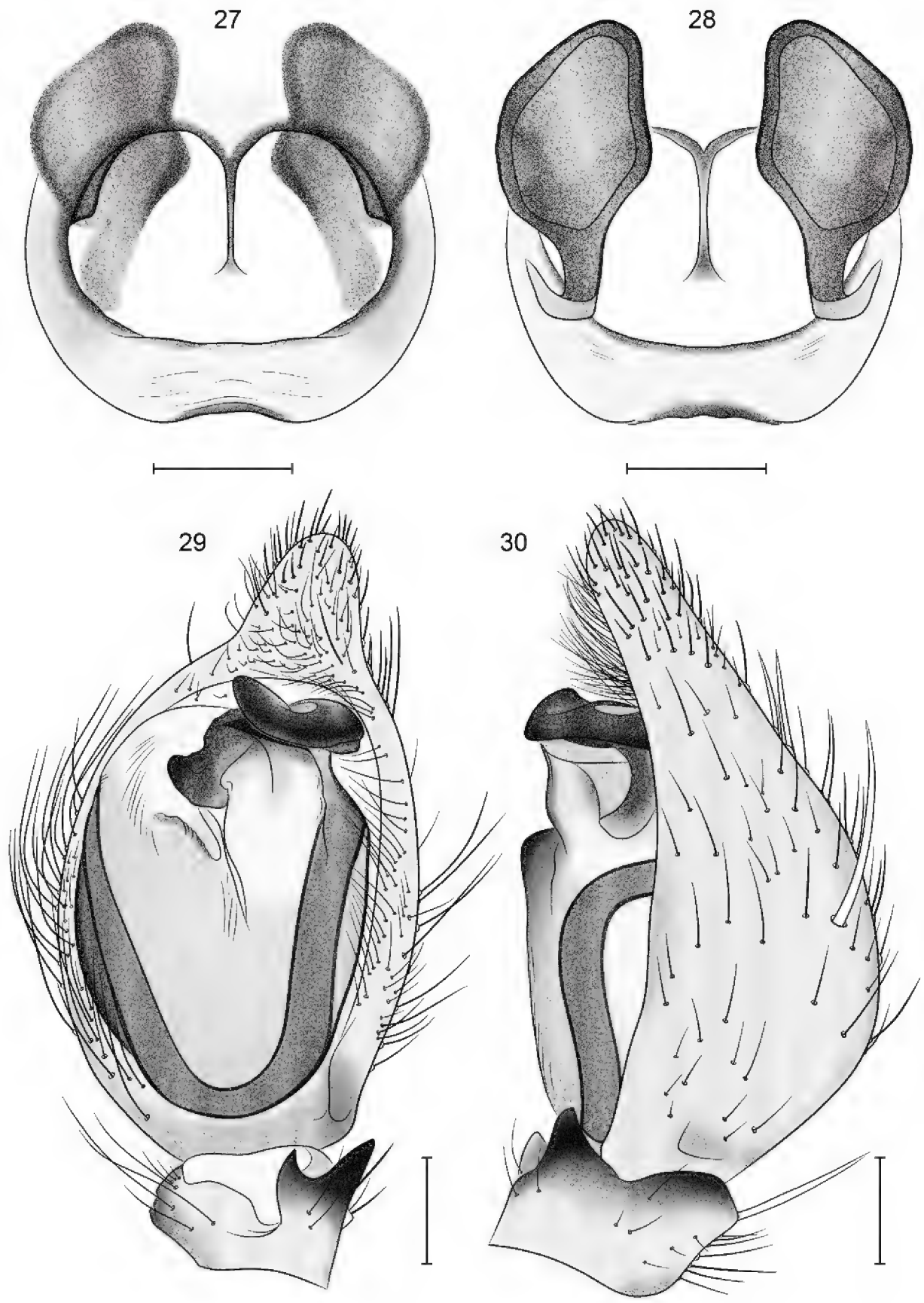
Remarks. The *terra typica* and the sole record of this troglophile species in the Caucasus is Lagodekhi (Marusik (1987) as *Carpatonesticus eriashvilii* (WSC 2023). Apart from Georgia, it was also recorded in two synantropic localities (cellars) in West and East Ukraine (Nentwig et al. 2023). It is the first record of *A. eriashvilii* in Tbilisi and the second within the country.

Family Oxyopidae Thorell, 1869
Genus *Oxyopes* Latreille, 1804

****Oxyopes badhyzicus* Mikhailov & Fet, 1986**
Figs 27–30

Oxyopes badhyzicus Levy, 1999: 46, figs 18A–C, 19A-B (♂♀).

Material examined. GEORGIA – Kakheti • 1♀; Dedoplistskaro mun., Chachuna Managed Reserve; N41.231156°, E46.147153°; 648 m a.s.l.; semidesert, vegetation; leg. Seropian A.; 17 Jul. 2023; CaBOL-ID 1035886 (Figs 27–28) • 1♀; N41.249974°, E45.948397°; 648 m a.s.l.; semidesert vegetation; leg. Seropian A.; 16 Jul. 2023; CaBOL-ID 1035885 • 1♀; N41.214409°, E 6.01487°; 648 m a.s.l.; semidesert vegetation; leg. Seropian A.; 16 Jul. 2023; CaBOL-ID 1035880 • 1♀; N41.223268°, E46.322996°; 648 m a.s.l.; semidesert vegetation; leg. Chitadze B.; 18 Jul. 2023; CaBOL-ID 1035908 • 1♀; N41.223701°, E46.325385°; 648 m a.s.l.; semidesert vegetation; leg. Chitadze B.; 18 Jul. 2023; CaBOL-ID 1035909 • 1♀; N41.223268°, E46.322996°; 648 m a.s.l.; osemidesert vegetation; leg. Chitadze B.; 18 Jul. 2023; CaBOL-ID 1035908 • 1♂; N41.2252°, E46.3236°; 648 m a.s.l.; semidesert vegetation; leg. Chitadze B.; 18 Jul. 2023; CaBOL-ID 1035916.



Figures 27–30. *Oxyopes badhyzicus* (**27**: female, epigyne, ventral view, in situ; **28**: endogyne, dorsal view; **29**: male, left palpus, ventral view; **30**: same, retrolateral view). Scale bars = 0.2 mm.

Barcoding. Five identical barcodes were obtained from the specimens: CaBOL-IDs 1035885, 1035886, 1035908, 1035909, and 1035916 (BOLD:AFN3105). There are currently no barcodes for *O. badhyzicus* in BOLD Systems; we are submitting the first ones.

Remarks. This species was described from Eastern Turkmenistan and is currently known to occur from Israel to Turkmenistan (WSC 2023). It is the first record of *O. badhyzicus* in the Caucasus. *Oxyopes badhyzicus* is closest to the co-occurring *O. globifer* Simon, 1876, from which males and females can be easily distinguished not only by the structure of copulatory organs but also by a rather delicate elongated abdomen and the pattern of carapace (broad dark margins and a light median longitudinal band in *O. globifer*; dark margins and two dark longitudinal bands extending from chelicerae to the eye field and the base of the carapace in *O. badhyzicus*). For species diagnosis, see Levy (1999).

Family Philodromidae Thorell, 1869
Genus *Philodromus* Walckenaer, 1826

***Philodromus emarginatus* (Schrank, 1803)**

Material examined. GEORGIA – Mtskheta-Mtianeti • 1♀; Kazbegi mun., Stepantsminda; N42.671°, E44.61°; 2050 m a.s.l.; leg. Wipfler B.; 7 Jul. 2019; ZFMK-TIS 8008608 (BOLD:AAY8533).

Barcoding. A single barcode was obtained from the specimen ZFMK-TIS 8008608 (BOLD:AAY8533) with the nearest neighbor in BOLD Systems *P. emarginatus* from Finland and Norway (BOLD:AAY8533, *p*-distance 0.15%).

Remarks. This species has a transpalaearctic range (Nentwig et al. 2023; WSC 2023), distributed throughout the whole Caucasus, with a single record in Georgia (Tbilisi) (Nentwig et al. 2023; Otto 2023). It is the first record of *P. emarginatus* in the Mtskheta-Mtianeti region and the second in the country.

****Philodromus fuscolimbatus* Lucas, 1846**
Fig. 31

Philodromus fuscolimbatus Muster & Thaler, 2004: 315, figs 13, 18a–b (♂♀).

Material examined. GEORGIA – Kvemo-Kartli • 1♀; Gardabani mun., Kumisi L.; N41.577°, E44.824°; 476 m a.s.l.; leg. Karalashvili E. & Krammer H.-J.; 16 Jul. 2019; ZFMK-TIS 8008363 (BOLD:AEZ9065)

Barcoding. A single barcode was obtained from the specimen ZFMK-TIS 8008363 (BOLD:AEZ9065) with the nearest neighbor in BOLD Systems *Philodromus* from Finland (*p*-distance 1.82%) with a private status.

Remarks. *Philodromus fuscolimbatus* has a Mediterranean distribution (Nentwig et al. 2023; WSC 2023). It is the first record of this species in the Caucasus. The previous record of *P. fuscolimbatus* from Azerbaijan was considered to be a misidentified *P. longipalpis* Simon, 1870 (Logunov and Huseynov 2008).

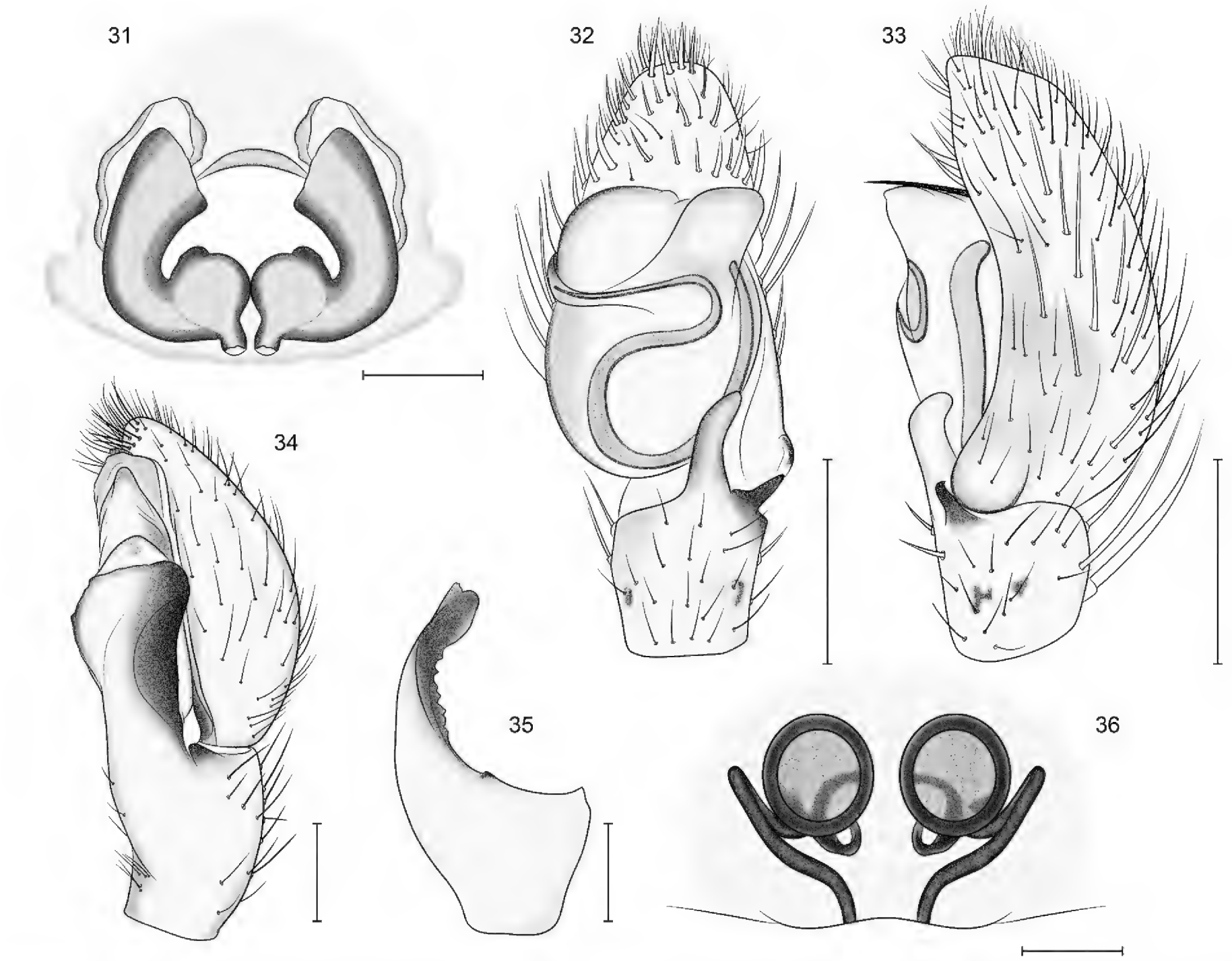
Genus *Pulchellodromus* Wunderlich, 2012

***Pulchellodromus medius* (O. Pickard-Cambridge, 1872)**
Figs 32–33

Philodromus medius Muster, Bosmans & Thaler, 2007: 57, figs 9, 23, 34, 45, 56, 67–68 (♂♀).

Material examined. GEORGIA – Kakheti • 1♂; Dedoplistskaro mun., Vashlovani NP, Mijniskure; N41.1127°, E46.6460°; 101 m a.s.l.; semidesert, light trap; leg. Kaitila J.-P. & Junnilainen J.; 22. May 2023; CaBOL-ID 1035791.

Remarks. Described from the Near East this species is distributed from Italy to Iran (Nentwig et al. 2023; WSC 2023). In the Caucasus, it is known from Azerbaijan and N Caucasus (Otto 2023). It is the first record of *P. medius* in Georgia. *Pulchellodromus medius* is closest to the co-occurring in the Caucasus *P. rufi-*



Figures 31–36. *Philodromus fuscolimbatus*, female (**31**: endogyne, dorsal view). *Pulchellodromus medius*, male (**32**: left palpus, ventral view; **33**: same, retrolateral view). *Phrurolithus azarkinae*, male (**34**: left palpus, retrolateral view; **35**: tibial apophysis, dorsal view). *Enoplognatha oelandica*, female (**36**: endogyne, dorsal view). Scale bars: 0.2 mm (31–33); 0.1 mm (34–36).

capillus (Simon, 1885), from which the males of *P. medius* can be distinguished by the long and triangular conductor (compact and truncate in *P. ruficapillus*) and different shape of the tibial apophysis.

Family Phrurolithidae Banks, 1892
Genus *Phrurolithus* C.L. Koch, 1839

***Phrurolithus azarkinae* Zamani & Marusik, 2020**
Figs 34–35

Phrurolithus azarkinae Zamani & Marusik, 2020: 313, figs 1A–F, 2A–F, 3A–D (♂♀).
Phrurolithus azarkinae Lecigne, 2021: 22, figs 21a–j (♂♀).

Material examined. GEORGIA – Kakheti • 1♂; Dedoplistskaro; N41.477288°, E46.1172°; 867 m a.s.l.; steppe, under rocks; leg. Seropian A.; 19 Apr. 2023; CaBOL-ID 1035825.

Remarks. This recently described species is known to occur in Armenia, Azerbaijan, Iran, and Turkey (Nentwig et al. 2023; WSC 2023). It is the first record of *P. azarkinae* in Georgia. The males of this species are readily distinguished from those co-occurring in the Caucasus *P. festivus* by a short conical embolus (cylindrical and bent in *P. festivus*) and a smaller retrolateral tibial apophysis.

Family Theridiidae Sundevall, 1833
Genus *Dipoena* Thorell, 1869

***Dipoena braccata* (C.L. Koch, 1841)**

Material examined. GEORGIA – Samtskhe-Javakheti • 1♀; Adigeni mun., Utkisubani Vill.; N41.661°, E42.607°; 1458 m a.s.l.; leg. Krammer H.-J. & Karalashvili E.; 19 Jul. 2019; ZFMK-TIS 8008464 (BOLD:AAO2442).

Baroding. A single barcode was obtained from the specimen ZFMK-TIS 8008464 (BOLD:AAO2442), identical to the COI gene of *D. braccata* from Germany and Norway (BOLD:AAO2442) in BOLD Systems.

Remarks. This species is distributed in the Mediterranean, Central Europe, the Caucasus, Scandinavia, and North Africa (Nentwig et al. 2023; WSC 2023). In the Caucasus, it is recorded in the North Caucasus and Georgia (Samachablo and Kakheti regions). It is the first record of *D. braccata* in the Samtskhe-Javakheti region.

Genus Enoplognatha Pavesi, 1880

***Enoplognatha oelandica* (Thorell, 1875)**
Fig. 36

Enoplognatha oelandica Bosmans & Van Keer, 1999: 224, figs 63–67 (♂♀).
Enoplognatha oelandica Huseynov & Marusik, 2008: 157, figs 7–9, 52–54, 67, 78 (♀).

Material examined. GEORGIA – Mtskheta-Mtianeti • 2♀♀; N of Shevardeni, Mna Valley; N42.58°, E44.47°; 2012 m a.s.l.; leg. Krammer H.-J. & Karalashvili E.; 7 Jul. 2019; ZFMK-TISs 8008103, 8008104 (BOLD:AFI9404).

Baroding. Two nearly identical barcodes were obtained from the specimens ZFMK-TIS 8008103 and 8008104 (BOLD:AFI9404, *p*-distance 0.15%). According to the BOLD Systems library, there are 3 barcodes of the species with a private status that failed to indicate a good match with our specimens. Either the specimens in the BOLD Systems belong to other species, or the COI gene is not a proper tool to differentiate this particular species.

Remarks. This species is distributed from Spain north to Sweden and east to Kazakhstan and China (Nentwig et al. 2023; WSC 2023). In the Caucasus, it is recorded in Azerbaijan and Dagestan (Otto 2023). It is the first record of *E. oelandica* in Georgia. The females of *E. oelandica* are distinguished from those of the diversa-species group by a median pit 1.5 times as wide as long and the copulatory ducts forming a large lateral loop.

Genus *Euryopis* Menge, 1868

Euryopis quinqueguttata Thorell, 1875

Material examined. GEORGIA – Shida Kartli • 1♀; Gori, Kvernaki ridge; N41.9833°, E44.1504°; 641 m a.s.l.; *Paliurus spina-christi* dominated shrubland; leg. Bulbulashvili N.; 20. May 2023; CaBOL-ID 1035496. Tbilisi • 1♀; Treligorebi Old Dwelling Hills; N41.7662°, E44.7671°; 473 m a.s.l.; under rocks; leg. Seropian A.; 9 Jul. 2023; CaBOL-ID 1035847.

Remarks. Distributed in the West of the West Palaearctic (Nentwig et al. 2023), known in the Caucasus from Azerbaijan, the North Caucasus, and Georgia (Samachablo region) (Otto 2023). It is the first record of *E. quinqueguttata* in the Shida Kartli region and Tbilisi, and the second in Georgia.

Genus *Latrodectus* Walckenaer, 1805

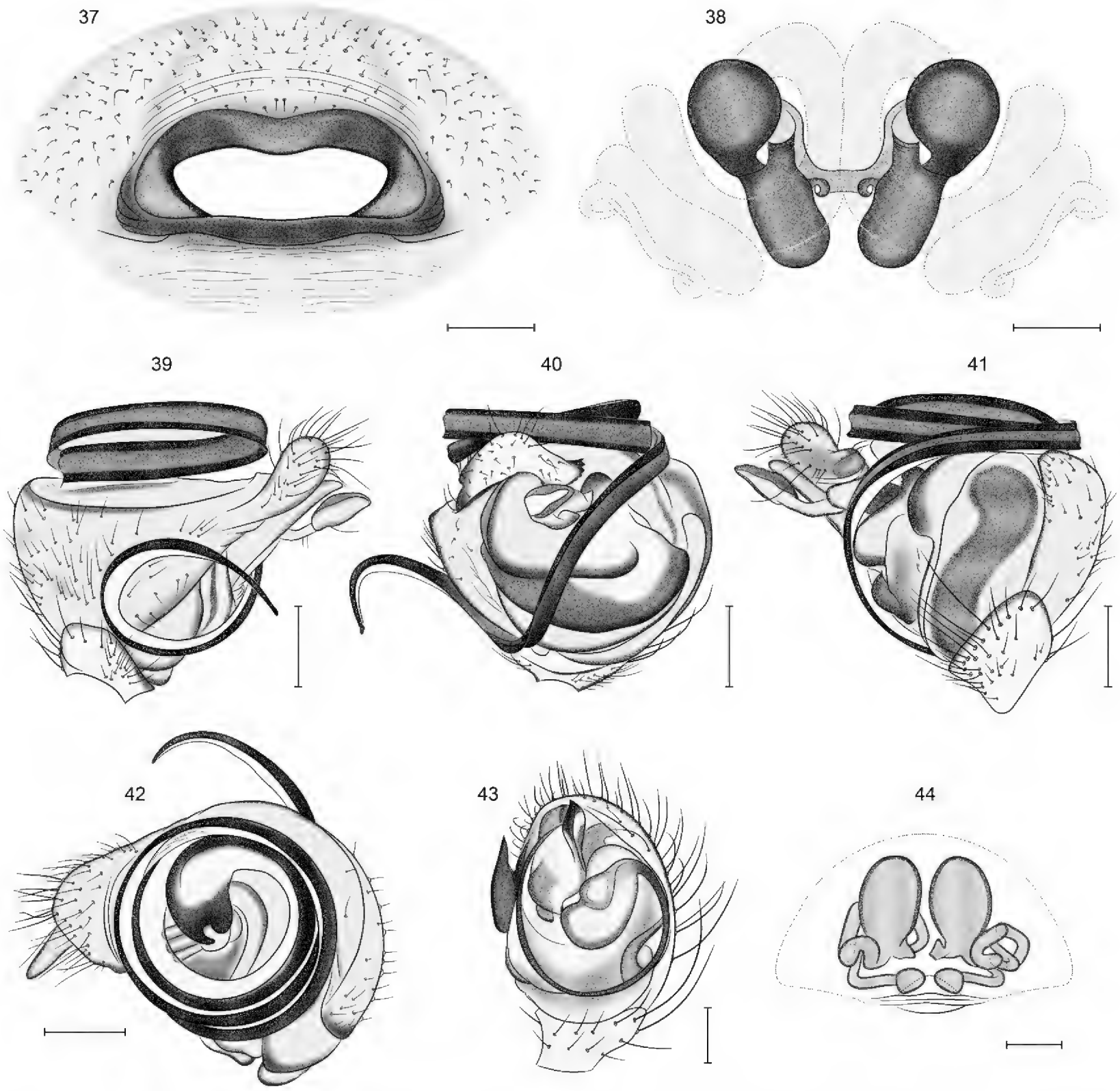
****Latrodectus pallidus* O. Pickard-Cambridge, 1872**

Figs 37–42

Latrodectus pallidus Levy, 1998b: 100, figs 183–188 (♀).
Latrodectus pallidus Zamani et al., 2014: 60, figs 2C, 3C, 4E (♂♀).

Material examined. GEORGIA – Kakheti • 2♀♀ (1 subadult); Dedoplistskaro mun., Chachuna Managed Reserve; N41.229592°, E46.139063°; 648 m a.s.l.; semidesert, shrubs; leg. Seropian A.; 19 Jul. 2023. • 14♀♀, 6♂♂; N41.231156°, E46.147153°; 648 m a.s.l.; semidesert; leg. Seropian A.; 17 Jul. 2023; semidesert, shrubs; leg. Seropian A.; 17 Jul. 2023; CaBOL-IDs 1035887, 1035888, 1035889, 1035890, 1035891, 1035892, 1035893, 1035894, 1035895, 1035896, 1035897, 1035898, 1035899, 1035900, 1035901, 1035902, 1035903, 1035904, 1035905, 1035906 • 7♀♀ (3 subadult); N41.229966°, E46.150206°; 648 m a.s.l.; semidesert, shrubs; leg. Seropian A.; 17 Jul. 2023; CaBOL-IDs • 7♀♀ (2 subadult), 2♂♂; N41.230042°, E46.147842°; 648 m a.s.l.; semidesert, shrubs; leg. Seropian A.; 17 Jul. 2023. • 5♀♀ (3 subadult), 8♂♂; N41.220055°, E46.019804°; 648 m a.s.l.; semidesert, shrubs; leg. Seropian A.; 16 Jul. 2023. • 1♀; N41.220575°, E46.01699°; 648 m a.s.l.; semidesert, shrubs; leg. Seropian A.; 16 Jul. 2023. • 4♀♀ (3 subadult); N41.214409°, E46.01487°; 648 m a.s.l.; semidesert, shrubs; leg. Seropian A.; 16 Jul. 2023; CaBOL-IDs 1035881, 1035882, 1035883, 1035884 • 5♀♀ (3 subadult); N41.213397°, E46.013024°; 648 m a.s.l.; semidesert, shrubs; leg. Seropian A.; 16 Jul. 2023. • 5♀♀ (4 subadult), 1♂; N41.213086°, E46.015515°; 648 m a.s.l.; semidesert, shrubs;; leg. Seropian A.; 16 Jul. 2023; leg. Seropian A.

Genetics. Twenty-three identical barcodes were obtained from the specimens CaBOL 1035881, 1035882, 1035883, 1035884, 1035887, 1035888, 1035889, 1035890, 1035891, 1035892, 1035893, 1035894, 1035895, 1035896, 1035897, 1035898, 1035899, 1035900, 1035901, 1035902, 1035903, 1035904, and 1035906 (BOLD:AAO3346) with the nearest neighbor in BOLD Systems *L. pallidus* from Turkey with a private status (maximum *p*-distance 0.15%). The second-best match is *L. pallidus* from Israel (BOLD:AAO3346, maximum *p*-distance 0.63%).



Figures 37–44. *Latrodectus pallidus* (**37**: female, epigyne, ventral view, in situ; **38**: endogyne, dorsal view; **39**: male, left palpus, prolateral view; **40**: same, ventral view; **41**: same, retrolateral view; **42**: same, apical view). *Theridion cinereum* (**43**: male, left palpus, ventral view; **44**: female, endogyne, dorsal view). Scale bars: 0.2 mm (37–42); 0.1 mm (43–44).

Remarks. This species is distributed from Cape Verde Island to Libya, South Africa, Turkey, Iran, and Central Asia (Nentwig et al. 2023; WSC 2023). It is the first record of *L. pallidus* in the Caucasus. Males and females were collected from the webs spun on the shrubs, with the cone retreats (up to 6 cm in length) tapering above the catching platform. Although all of the males have been collected directly from the female retreats, the fact that 1/3 of the females are still immature suggests the beginning of the mating season in Georgia in late June-July. From the co-occurring in the Caucasus *L. dahli* Levi, 1959 and *L. tredecimguttatus* (Rossi, 1790), it is easily distinguished by the creamy-white coloration of the abdomen (dorsally covered with large irregular yellow spots with dark margins in males, and small irregular spots in females), whereas females of *L. dahli* are black (with a thin median white stripe ventrally), males are light yellow, with 3 to 5 pairs of black spots on dorsum; *L. tredecimguttatus* juveniles, males, and females are black, with abdomens dorsally covered with 13

red spots with white margins (this ornament is generally reduced (sometimes totally) to the thin white margins in adult females from the local populations). Males of *L. pallidus* have an embolus coiling up to three times around the cymbium (a single coil in *L. dahli*).

Genus *Theridion* Walckenaer, 1805

***Theridion cinereum* Thorell, 1875**
Figs 43–44

Theridion cinereum Kovblyuk et al., 2016: 110, figs 283–290 (♂♀).
Theridion cinereum Zamani et al., 2021: 295, figs 12A–B (♂).

Material examined. GEORGIA – Kvemo Kartli • 1♀; Marneuli mun., Shulaveri; N41.3681°, E44.8219°; 479 m a.s.l.; *Paliurus spina-christi* dominated shrubland, under rocks; leg. Seropian A., Bulbulashvili N., Zukakishvili A.; 3 Jun. 2023; CaBOL-ID 1020880. Shida Kartli • 1♀, 1♂; Gori, Kvernaki ridge; N41.9833°, E44.1504°; 641 m a.s.l.; *Paliurus spina-christi* dominated shrubland, under rocks; leg. Bulbulashvili N.; 20. May 2023; CaBOL-IDs 1035502, 1035503.

Remarks. This species is distributed from Italy north to Switzerland, east to Kyrgyzstan, and south to Iran (Nentwig et al. 2023; WSC 2023). In the Caucasus, it was known from the North Caucasus (Otto 2023). It is the first record of *T. cinereium* in Georgia and the South Caucasus.

Family Thomisidae Sundevall, 1833
Genus *Bassaniodes* Pocock, 1903

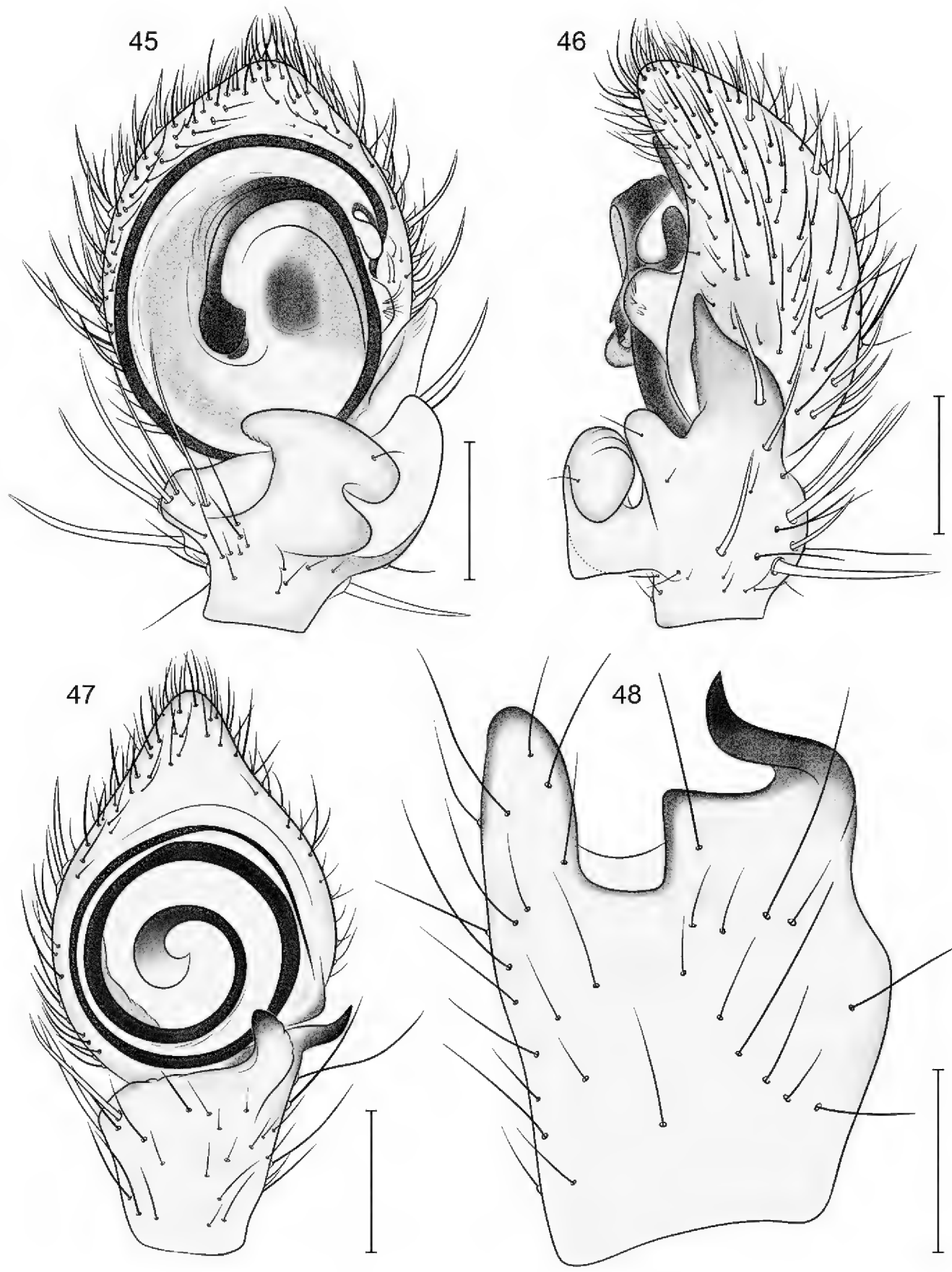
****Bassaniodes pseudorectilineus* (Wunderlich, 1995)**
Figs 45–46

Psammitis pseudorectilineus Wunderlich, 1995: 764, figs 52–53 (♂).
Xysticus pseudorectilineus Demir, Aktaş & Seyyar, 2008: 65, figs.1–7 (♂♀).

Material examined. GEORGIA – Tbilisi • 1♀; Dighomi Vill.; N41.7816°, E44.6906°; 797 m a.s.l.; *Paliurus spina-christi* dominated shrubland, under rocks; leg. A. Seropian; 24 Sep. 2021; CaBOL-ID 1010063 • 2♂♂; Tbilisi; N41.7701°, E44.7669°; 436 m a.s.l.; under rocks in heathland; leg. A. Seropian; 01 Sep. 2023; CaBOL-IDs 1035912, 1035913. Kakheti • 1♀; Dedoplistskaro mun., Vashlovani NP, Lekistskali (Mlashetskali) R. bank; N41.1394°, E46.5808°; 213 m a.s.l.; semidesert, under rocks leg. A. Seropian; 17 Apr. 2021; CaBOL-ID 1010431.

Genetics. Two barcodes were obtained from the specimens with CaBOL-IDs 1010063 and 1035912 (BOLD:AAO1746, *p*-distance 1.06%), with the nearest neighbor in BOLD Systems *B. pseudorectilineus* (Wunderlich, 1995) from Turkey (BOLD:AAO1746, mean *p*-distance 0.47%).

Remarks. This species is very close to *B. loeffleri* (Roewer, 1955) found in Georgia (Otto 2023), from which the males of *B. pseudorectilineus* differ in the



Figures 45–48. *Bassaniodes pseudorectilineus*, male (**45**: left palpus, ventral view; **46**: same, retrolateral view). *Tmarus piochardi*, male (**47**: left palpus, ventral view; **48**: tibial apophysis, dorsal view). Scale bars: 0.2 mm (45–47); 0.1 mm (48).

presence of an ovate-shaped translucent apophysis in front of the embolus tip with a club-shaped outgrowth (Wunderlich 1995), while the females of these species are indistinguishable (see figures and colored photos in Nentwig et al. 2023). Considering the relatively poor details of *B. loeffleri* palp drawings, the extreme (and suspicious) similarity of females' epigynes and endogynes, as well as the sympatry (Nentwig et al. 2023), additional study of the type specimens of these two species is required for potential synonymy confirmation, with *B. pseudorectilineus* being the junior synonym. Until then, this is the first record of this species in the Caucasus, unless otherwise stated. In addition, the previous record of *B. loeffleri* in Georgia requires validation since no drawings were provided by Pkhakadze (2006).

Genus *Tmarus* Simon, 1875

****Tmarus piochardi* (Simon, 1866)**
Figs 47–48

Tmarus piochardi Zamani, 2015: 18, figs 3A–D (♂♀).
Tmarus piochardi Lecigne, 2016: 115, figs 11B-D (♂).

Material examined. GEORGIA – Kakheti • 2♂♂; Dedoplistskaro mun., Vashlovani NP, Mijniskure; N41.1127°, E46.6460°; 101 m a.s.l.; semidesert, light trap; leg. Kaitila J.-P. & Junnilainen J.; 22. May 2023; CaBOL-IDs 1035797, 1035816.

Remarks. This species is distributed from the Iberian Peninsula to Iran (Nentwig et al. 2023; WSC 2023). It is the first record of *T. piochardi* in the Caucasus. The males of this species are readily distinguished from those co-occurring in the Caucasus congeners by the shape of the tibial apophysis.

Genus *Xysticus* C.L. Koch, 1835

***Xysticus bifasciatus* C.L. Koch, 1837**

Material examined. GEORGIA – Racha-Leckhumi and Kvemo Svaneti • 1juv.; Oni mun., Tskhmori Vill; N42.53125°, E43.470933°; 1225 m a.s.l.; *Fagus* sp. forest; leg. Astrin J.; 18 Jul. 2018; ZFMK-TIS 8000027 (BOLD:AAL7717).

Genetics. A single barcode was obtained from the specimen ZFMK-TIS 8000027 (BOLD:AAL7717) with the nearest neighbor in BOLD Systems *X. bifasciatus* from Germany (BOLD:AAL7717, *p*-distance 0.78%).

Remarks. The first record of this species in Georgia is based solely on the determination via barcode, which further can be supported by earlier records of *X. bifasciatus* in the South Caucasus (Azerbaijan) and the North Caucasus (Otto 2023) and Western Palaearctic distribution (Nentwig et al. 2023; WSC 2023).

Discussion

Summarizing the results of the publications within the series dedicated to the study of the Georgian diversity of spiders with roots traced back to the year 2006, 132 species were recorded in the country for the first time (Seropian et al. 2023a, b; present study). Accounting for this article's results, 792 species of 289 genera and 44 families of spiders are recorded in Georgia. Herein, three genera (namely *Apostenus* Westring, 1851; *Evippa* Simon, 1882; and *Pulchellodromus* [O. Pickard-Cambridge, 1872]) and 24 species of spiders are recorded in Georgia for the first time, including 11 species (*Clubiona reclusa*, *Brigittea innocens*, *Lathys lehtineni*, *Pelecopsis parallela*, *Apostenus humilis*, *Evippa sjostedti*, *Oxyopes badhyzicus*, *Philodromus fuscolimbatus*, *Latrodectus pallidus*, *Bassaniodes pseudorectilineus*, and *Tmarus piochardi*) that are new records for the Caucasus region. The abovementioned emphasizes the importance of Georgia and the Caucasus region as a whole as a stepping stone for European and Asian araneofaunas.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

AS, NH and H-JK led the writing, AS and H-JK performed morphological species identification, AS prepared figures, AS, NH, NB and EK collected the specimens, JT, NK and AD exracted DNA.

Author ORCIDs

Armen Seropian https://orcid.org/0000-0003-3777-9954
Natalia Bulbulashvili https://orcid.org/0000-0002-6802-1209
Hans-Joachim Krammer https://orcid.org/0009-0008-7012-1752
Nils Hein https://orcid.org/0000-0002-5172-8531
Elisabeth Karalashvili https://orcid.org/0000-0002-9015-7604
Nino Kachlishvili https://orcid.org/0000-0002-5632-8959
Anastasia Datunashvili https://orcid.org/0009-0006-1421-2057

Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

References

Almquist S (2006) Swedish Araneae, part 2 – families Dictynidae to Salticidae. Insect Systematics & Evolution, Supplement 63: 285–601.

Azarkina GN, Nuruyeva TV (2021) First description of the female of *Evippa caucasica* Marusik, Guseinov et Koponen, 2003 (Aranei: Lycosidae). Euroasian Entomological Journal 20(6): 338–342. https://doi.org/10.15298/euroasentj.20.6.07

Bosselaers J (2009) Studies in Liocranidae (Araneae): redescriptions and transfers in *Apostenus* Westring and *Brachyanillus* Simon, as well as description of a new genus. Zootaxa 2141: 37–55. https://doi.org/10.11646/zootaxa.2141.1.3

Bosmans R, Van Keer J, Russell-Smith A, Hadjiconstantis M, Komnenov M, Bosselaers J, Huber S, McCowan D, Snazell R, Decae A, Zoumides C, Kielhorn K-H, Oger P (2019) Spiders of Cyprus (Araneae). A catalogue of all currently known species from Cyprus. Newsletter of the Belgian Arachnological Society 34, Suppl. 1: 1–173.

Bosmans R, Gavalas I (2023) The spiders (Araneae) of the tiny Greek island Iraklia (Kiklades), with the descriptions of 5 new *Harpactea* species (Araneae: Dysderidae), 3 species new to Europe and 8 new to Greece. Parnassiana Archives 11(Supplementum 1): 1–91.

Crespo LC, Domènech M, Enguídanos A, Malumbres-Olarte J, Cardoso P, Moya-Laraño J, Frías-López C, Macías-Hernández N, De Mas E, Mazzuca P, Mora E, Opatova V, Planas E, Ribera C, Roca-Cusachs M, Ruiz D, Sousa P, Tonzo V, Arnedo MA (2018) A DNA barcode-assisted annotated checklist of the spider (Arachnida, Araneae) communities associated to white oak woodlands in Spanish National Parks. Biodiversity Data Journal 6(e29443): 1–459. https://doi.org/10.3897/BDJ.6.e29443

Danilov SN (1999) The spider family Liocranidae in Siberia and Far East (Aranei). Arthropoda Selecta 7: 313–317.

Danışman T, Gündüz G, Bayram A, Coşar İ, Allahverdi H (2014) Contributions to the knowledge of dictynid spider fauna of Turkey (Araneae, Dictynidae). Serket 14(2): 63–67.

Deltshev C, Barjadze S, Maghradze E (2023) On the cave spiders of Georgia with description of a new blind *Centromerus* (Arachnida: Araneae). Historia Naturalis Bulgarica 45(11): 283–292. https://doi.org/10.48027/hnb.45.113

Di Franco F (2002) New data on four little-known species of the genus *Zelotes* Gistel, 1848 (Araneae, Gnaphosidae). Bulletin of the British Arachnological Society 12: 196–200.

Dunin PM (1984) Fauna and ecology of the spiders (Aranei) of the Apsheron Peninsula (Azerbajanian SSR). Perm University, 45–59. [in Russian]

Dunin PM (1989) Fauna and altitudinal distribution of spiders (Arachnida, Aranei) of the Azerbaijan part of the southern macroslope of the Caucasus Major. Nauka: Fauna i ecologia paukov i skorpionov, Moscow, 31–39. [in Russian]

Dunin PM, Mamedov AA (1992) Spiders in cotton fields of the southeastern part of Azerbaijan. Bulleten Moskovskogo obstshestva ispytatelei prirody. Otdelenie biologicheskoe 97(6): 53–61. [in Russian]

Esyunin SL, Kabdrakhimov AA (2023) New data on the spider fauna of West Kazakhstan Region (Arachnida: Araneae). Bulletin of Perm University, Biology 2023(1): 19–30. https://doi.org/10.17072/1994-9952-2023-1-19-30

Gaymard M, Lecigne S (2018) Contribution à la connaissance de l'aranéofaune (Araneae) du Gard et en particulier du massif des Gorges du Gardon (Occitanie, France). Bulletin de l'Association Française d'Arachnologie 1: 1–39.

Geiger MF, Astrin JJ, Borsch T, Burkhardt U, Grobe P, Hand R, Hausmann A, Hohberg K, Krogmann L, Lutz M, Monje C, Misof B, Morinière J, Müller K, Pietsch S, Quandt D, Rulik B, Scholler M, Traunspurger W, Haszprunar G, Wägele W (2016) How to tackle

the molecular species inventory for an industrialized nation — lessons from the first phase of the German Barcode of Life initiative GBOL (2012–2015) 1. Genome 59(9): 661–670. https://doi.org/10.1139/gen-2015-0185

Guseinov EF (1999) Spiders of Lenkoran Natural region and Absheron Peninsula in Azerbaijan. Abstract of PhD thesis. Baku, 29 pp. [in Russian]

Kovblyuk MM, Marusik YM, Ponomarev AV, Gnelitsa VA, Nadolny AA (2011) Spiders (Arachnida: Aranei) of Abkhazia. Arthropoda Selecta 20(1): 21–56. https://doi.org/10.15298/arthsel.20.1.03

Kovblyuk MM, Kastrygina ZA, Omelko MM (2012) A review of the spider genus *Haplodrassus* Chamberlin, 1922 in Crimea (Ukraine) and adjacent areas (Araneae, Gnaphosidae). ZooKeys 205: 59–89. https://doi.org/10.3897/zookeys.205.3491

Kovblyuk MM, Kastrygina ZA, Omelko MM (2014) New *Lathys* Simon, 1884 species from Crimea (Aranei: Dictynidae). Arthropoda Selecta 23(2): 195–198. https://doi.org/10.15298/arthsel.23.2.08

Kovblyuk MM, Gnelitsa VA, Nadolny AA, Kastrygina ZA, Kukushkin OV (2016) Spiders (Arachnida: Aranei) of the Karadag Nature Reserve (Crimea). Ekosistemy 3(2015): 3–288. [in Russian]

Lecigne S (2016). Contribution à la connaissance de l'aranéofaune (Araneae) de Crète (Grèce) et description de la femelle inconnue de *Neaetha absheronica* Logunov & Guseinov, 2002 (Salticidae). Nieuwsbrief van de Belgische Arachnologische Vereniging 30(3): 95–118.

Lecigne S (2021) A new species of *Sintula* (Linyphiidae), redescription of *Brigittea innocens* (Dictynidae) and eight spider species newly recorded for Turkey (Araneae). Arachnologische Mitteilungen 62: 11–34. https://doi.org/10.30963/aramit6204

Levy G (1995) Revision of the spider subfamily Gnaphosinae in Israel (Araneae: Gnaphosidae). Journal of Natural History 29(4): 919–981. https://doi.org/10.1080/00222939500770351

Levy G (1999) The lynx and nursery-web spider families in Israel (Araneae, Oxyopidae and Pisauridae). Zoosystema 21: 29–64.

Logunov DV, Huseynov EF (2008) A faunistic review of the spider family Philodromidae (Aranei) of Azerbaijan. Arthropoda Selecta 17: 117–131.

Marusik YM (1987) Three new species of the family Nesticidae (Aranei) from the fauna of the USSR. Zoological Journal Moscow 66(3): 461–463. [in Russian]

Marusik YM, Esyunin SL, Tuneva TK (2015) A survey of Palaearctic Dictynidae (Araneae). 1. Taxonomic notes on *Dictynomorpha* Spassky, 1939, *Brigittea* Lehtinen, 1967 and *Lathys* Simon, 1884. Zootaxa 3925(1): 129–144. https://doi.org/10.11646/zootaxa.3925.1.9

Marusik YM, Fedoriak MM, Koponen S, Prokopenko EV, Voloshyn VL (2017) Taxonomic notes on two species of Nesticidae (Arachnida: Araneae) in the Ukraine, with the first description of the male of *Carpathonesticus eriashvilii*. Arachnology 17(6): 302–308. https://doi.org/10.13156/arac.2017.17.6.302

Murphy J (2007) Gnaphosid genera of the world. British Arachnological Society, St Neots, Cambridgeshire 1, i-xii, 1-92; 2, i-ii, 93–605.

Muster C, Bosmans R, Thaler K (2007) The *Philodromus pulchellus*-group in the Mediterranean: taxonomic revision, phylogenetic analysis and biogeography (Araneae: Philodromidae). Invertebrate Systematics 21(1): 39–72. https://doi.org/10.1071/IS06014

Mikhailov KG (1995) Erection of infrageneric groupings within the spider genus *Clubiona* Latreille, 1804 (Aranei Clubionidae): a typological approach. Arthropoda Selecta 4(2): 33–48.

Nentwig W, Bosmans R, Gloor D, Hänggi A, Kropf C (2023) Spiders of Europe. Version: 12.2022, Available from: https://www.araneae.nmbe.ch (Accessed: 31/10//2023)

Otto S (2023) Caucasian Spiders. A faunistic database on the spiders of the Caucasus. Version: 02.2022. https://caucasus-spiders.info/ (Accessed: 31/10/2023)

Pkhakadze V (2006) The spiders of Tbilisi valley (Arthropoda, Araneae): fauna, ecology, zoogeography. Dissertation at the Javakhishvili University, 153 pp. (in Georgian)

Ponomarev AV, Aliev MA, Khabiev GN, Shmatko VY (2019) New data on the spider fauna (Aranei) of Dagestan, Russia. Arthropoda Selecta 28(2): 309–334. https://doi.org/10.15298/arthsel.28.2.14

Ponomarev AV, Shmatko VY (2020) A review of spiders of the genera *Trachyzeloes* Lohmander, 1944 and *Marinarozelotes* Ponomarev, gen. n. (Aranei: Gnaphosidae) from the southeast of the Russian Plain and the Caucasus. Caucasian Entomological Bulletin 16(1): 125–139. https://doi.org/10.23885/181433262020161-125139

Ratnasingham S, Hebert PDN (2013) A DNA-based registry for all animal species: The Barcode Index Number (BIN) system. PLoS ONE 8(7): e66213. https://doi.org/10.1371/journal.pone.0066213

Roberts MJ (1987) The spiders of Great Britain and Ireland, Volume 2: Linyphiidae and check list. Harley Books, Colchester, England, 204 pp.

Seropian A, Otto S, Bulbulashvili N (2023) Picking pearls from the Silk Road: Insights into the spider (Arthropoda, Araneae) diversity in Georgia from the CaBOL project. Part I. Caucasiana 2: 143-159. https://doi.org/10.3897/caucasiana.2.e107049

Seropian A, Bulbulashvili N, Otto S, Krammer H-J, Kachlishvili N, Datunashvili A (2023) Picking pearls from the Silk Road: Insights into the spider (Arthropoda, Araneae) diversity in Georgia from the CaBOL project. Part II. Caucasiana 2: 231–297. https://doi.org/10.3897/caucasiana.2.e110536

Tanasevitch AV (1990) The spider family Linyphiidae in the fauna of the Caucasus (Arachnida, Aranei). In: Striganova BR (ed.) Fauna nazemnykh bespozvonochnykh Kavkaza. Moscow, Akaedemia Nauk, pp. 5–114.

World Spider Catalog (2023) World Spider Catalog. Version 23.5. Natural History Museum Bern, online at http://wsc.nmbe.ch (Accessed: 31/10/2023). https://doi.org/10.7892/BORIS.105054

Wunderlich J (1995) Zur Kenntnis west-paläarktischer Arten der Gattungen *Psammitis* Menge 1875, *Xysticus* C. L. Koch 1835 und *Ozyptila* Simon 1864 (Arachnida: Araneae: Thomisidae). Beiträge zur Araneologie 4: 749–774.

Wunderlich J, Schütt K (1995) Beschreibung der bisher verkannten Sackspinnen-Art *Clubiona frisia* n.sp. aus Europa (Arachnida: Araneae: Clubionidae). Entomologische Zeitschrift 105: 10–17.

Zamani A (2015) The spider collection (Arachnida: Araneae) of the Zoological Museum of the Iranian Research Institute of Plant Protection, with new species records for Iran. Arachnologische Mitteilungen 50: 11–18. https://doi.org/10.5431/aramit5002

Zamani A, Dimitrov D, Weiss I, Alimohammadi S, Rafiei-Jahed R, Esyunin SL, Moradmand M, Chatzaki M, Marusik YM (2020) New data on the spider fauna of Iran (Arachnida: Araneae), part VII. Arachnology 18(6): 569–591. https://doi:10.13156/arac.2020.18.6.569

Zamani A, Nadolny AA, Esyunin SL, Marusik YM (2021). New data on the spider fauna of Iran (Arachnida: Araneae), part VIII. Zoosystematica Rossica 30(2): 279–297. https://doi.org/10.31610/zsr/2021.30.2.279

Zamani A, Marusik YM (2024) New data on *Dysdera* Latreille, 1804 and *Harpactea Bristowe*, 1939 (Araneae: Dysderidae) of the Caucasus, with new species and records. Zootaxa 5397(2): 195–217. https://doi.org/10.11646/zootaxa.5397.2

Zhang F, Peng JY, Zhang BS (2022) Spiders of Mt. Xiaowutai. Science Press, Beijing, 387 pp.